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Desirable Illumination.

[By a "MANCHESTER MAN."]

The interests and comfort of the community are entirely dependent on good and reliable illumination, whilst for trade and manufacture it is indispensable; the problem of providing it is, therefore, an all important one. From the economic and hygienic points of view proper lighting does not always receive the consideration and study due to it. Public authorities are commencing to recognize its importance, and quite recently in Great Britain the Home Secretary appointed a Committee to investigate and report on the lighting of factories. This inquiry will cover the conditions necessary for *adequate* and *suitable* lighting, having regard to the nature of the work carried on in factories and works of every description, as varied as cotton mills, engineering shops, printing offices and warehouses; with special reference to the protection of the eyes of the persons employed, and the various kinds of illuminants. Results of great importance and interest are expected, as practical illuminating engineers of the first rank have been invited to join the Committee, whilst the Chairman is to be a distinguished scientist, and a director of the National Physical Laboratory. It may be reasonably assumed that the Committee will be able to do much to add to our knowledge of the all important and very much neglected subject of artificial illumination. An obvious and difficult problem to be solved will be the talk of defining what precisely constitutes "adequate lighting." A very broad and elastic definition may result, or one with stringent limits. Even the most casual observer and amateur must have noticed the very remarkable changes which have taken place in modern methods of illumination, during the last few years, and it can scarcely be said that in every case the best methods of using the new lamps have been sufficiently or carefully studied. Every expert knows that it does not suffice to get more light, but that it is equally necessary to obtain better light. A proposed light should be studied from every point of view; hence the object to be served by installing each light should be borne in mind, and the expert should make sure that each light is applied in such a way as to be the best aid to the user. It is by no means an exceptional experience to note that powerful lights are used, which, owing to their unsuitable position, do not give as satisfactory illumination as lights of smaller candle power, which have been judiciously placed.

A very prominent illuminating engineer has said that the value of good lighting can be noted to come under three heads: First, as an hygienic necessity; second, as a means of preventing accidents; third, as being most desirable on purely economic grounds. The hygienic results of good and bad lighting are all-important to practically every member of the community. There is the most abundant evidence available as to the prejudicial effects of poor lighting, more especially in dwelling houses, as ill lighted corridors and dark corners cannot be associated with cleanliness and order. For reading purpose, and other home life pastimes, lighting must be correct, otherwise defective vision, from an undue strain on the eyes, is bound to result. Inquiries made in Germany have brought to light that serious consequences have followed insufficient and unscientifically grouped lighting. It has been ascertained that, largely owing to inadequate lighting in the German technical schools, no less than 22 per cent. of the scholars suffer from defective vision, whilst in the secondary schools, as many as 31.5 per cent. of the more advanced pupils are short sighted. A noted medical school specialist, who has devoted special attention to the subject, asserts that he can trace a very definite relation between the lighting of schools and the number of short sighted students. Even in London very many of the public schools are defectively lighted. In a school room it is of the utmost importance to avoid glare, and artificial light should never be obtained from a number of distributed bright points.

The last century dwellers, accustomed to such comparatively mild lights as the candle and oil lamps, could disregard this point, but more recently the continuous increase in the brilliancy of illuminants has made glare all important; an evil result of want of thought, which must be avoided. The "intrinsic brilliancy," which is expressed in candle power per square inch of radiating surface, of some modern illuminants, has been determined by a European expert to be as follows: Petroleum lamp, 20; incandescent mantle, 35; carbon filament lamp, 450; metallic filament lamps, 1,100; Nernst filament, glow lamp, 2,250; arc light, 17,000. It is within everyone's experience that the most brilliant modern lamps have a dazzling effect on the eyes, when they are injudiciously used, and many experts have expressed the opinion that all sources of light should be screened down, so that their intrinsic brilliancy shall not exceed that of the sky, which has been estimated at about 3-candle power per square inch. In school rooms, offices and workrooms, the light should be concentrated on the work, whilst the illuminating units should be screened in such a manner as to prevent the direct rays from bright filaments and mantles from striking the eye, and in any case such lights should not be suspended in the direct range of vision.

Adequate lighting of factories is most important. Take one class, say textile mills, in which the operatives are engaged in constant supervision of a number of complicated machines. It is only possi-

ble for these machines to be properly attended to when the lighting is satisfactory. It is all important that the light should be both strong and diffused into every corner, so that all the intricate portions of the machinery and the delicate materials which are being manufactured by them, can be properly seen, without undue effort or strain on the eye. Efficient lighting is, in the long run, an economy; less work is rejected or defective, the output will be increased and both the employed and the employers are benefited. A new field for improved illumination is being opened out in the mining industry and already considerable progress has been made. Miners have satisfied themselves that more work can be done with improved lighting, more than enough to justify the additional cost. Employers have every reason to welcome improved methods of lighting. Maintaining an obsolete or defective system is a mistaken economy. Effective lighting is the natural complement of expensive machinery, and a well paid and expert staff. The cost of lighting is a very small item relatively to the amount paid in wages, and it is also important to note that efficient lighting may prevent costly accidents.

Street Lighting.

[By Mr. K. G. Rennie, C.E., Engineer, St. Joseph, Mo.]

The author, in a lengthy communication on this subject, to "Municipal Engineering," remarked that the purpose of street lighting has remained the same, and is now, as it was four centuries since, a measure of public safety and an adjunct to the police force. All the requirements of a complicated civilization demand lighting upon a vastly more liberal scale than sufficed for earlier days, or than is generally found in many localities even now.

Except in the vision of details at comparatively short range, we see things by virtue of their difference of color and luminosity In weak light, color, as such, is inconspicuous, so that practical vision depends chiefly on the power of distinguishing differences of luminosity.

Whatever may be the absolute values of light received, the relative values, as expressed by the coefficient of reflection, range practically from about 0.1 to 0.04, or a little less. In other words, the blackest object returns about one-twentieth the light returned by the brightest object. Ability to distinguish between stationary objects by their differences in luminosity depends, then, on the capacity of the eye as regards shade perception. The fundamental fact underlying this is that the eye can perceive within a wide range of absolute intensity a fairly constant difference in luminosity.

As the illumination falls below about 10 lux we see less well, so that by the time the illuminatiou is down to 1 lux our shade perception is very seriously impaired, as is also our ability to distinguish details, visual acuity, etc.

Street Light Must Be Stronger Than Twilight.—No illumination which depends chiefly on twilight vision can be seriously considered for the purposes of street lighting. It, of course, has its usual place in merely enabling one to find his way. The common citizen wants to distinguish the shadow of a post from a hole in the pavement before he is fairly upon it. The man who is driving upon the streets needs to see his way clearly, without risk of running into the gutter, and the policeman should be able to tell a belated householder from a burglar using his jimmy on a window or a front door. And, finally, in many places it is highly important to have enough additional light to distinguish faces clearly, to see even trivial obstacles clearly and to read the numbers on houses.

I shall here classify the streets for the purpose of street lighting, into first, second and third classes.

By first class I mean the principal streets of a city from the stand point of nocturnal traffic and the requirements of the police.

The streets requiring second-class light are reasonably orderly, and the general conditions are such that neither from the viewpoint of the wayfarers nor from that of the policeman is brilliant illumination necessary.

Finally, there are in every city a number of streets which require practically very little illumination. They are mostly in the outlying portions of the city, and sometimes they are mere roads leading away from the structural part of a city.

First-class streets in constant use for dense traffic of one kind or another, or so classified from the police standpoint, certainly require reading illumination. The intensity of the illumination required is practically that specified for public places; that is, an extreme minimum of 0.5 lux and an average of fully double that amount. Theory and practice concur in holding that a street so lighted is well lighted.

As regards second-class streets the requirements are, of course, less severe. There should be light enough to recognize a friend without stumbling over him, or to see the number of a house comfortably. The average illumination for this purpose may be not less than 0.5 lux, and the minimum should be nowhere less than about 0.25. Streets so lighted will be comfortably lighted near the lamps, and the lighting will be as good as moonlight even at the darkest spot.

Finally, we come to the third-class streets. The degree of illumination required need not be greater than is afforded by bright moonlight. It is illumination similar to that which is required for some of the park lighting, say from 0.3 down to 0.1 lux. At such low intensities it would be better to cut down the intrinsic brilliancy of the light by screening, so as not to spoil the dark adaptation which is necessary for utilizing so low a degree of light. In streets so dimly lighted the silhouette effect is rather marked, and it is not desirable to forego the advantage of a tolerably light surface on the streets. Considerations of economy in street lighting enforce such classification of streets as here described.

Few cities can afford, even at the present scale of public expenditures, to light brilliantly any large proportion of their streets. If an attempt were made to light all the streets alike there would be no first-class lighting at all. In small cities, where the traffic is never very dense, and the use of streets at night moderate, very little first-class lighting is required. The burden of lighting perhaps falls more heavily on small cities than on large, owing to the large amount of street mileage compared with the assessable values. Hence, in such places will be, relatively, considerable amounts of third-class lighting. Moonlight schedules are unsatisfactory, for the weather is no respecter of moonlight.

The only suitable lighting for cities of any importance is the all-night and every-night schedule. This is commonly based on starting the lamps half an hour after sunset and extinguishing them half an hour before sunrise every day in the year. The all-night and every-night schedule will be found to run between 3,900 and 4,000 hours a year. If the full schedule is to be modified it is better to modify it in the morning hours than in the hour of lighting up, by reason of the greater traffic in the evening.

A plan is followed in some European cities of lighting all the lights every night, from dusk to midnight, or 1 o'clock, and then extinguishing part of them. This plan is coming into rapid favor in nearly all of the principal cities in America and Europe, where ornamental posts are used with cluster lights, and is acknowledged to be the most economical illuminating system yet introduced.

The same reasoning might apply to a few second-class streets. A consistent application of this principle might reduce the average hours of lighting per year from 4,000, of the all-night schedule, to some point between 3,000 and 3,500 hours, depending on the number of lights extinguished. If rigorous economy in street lighting is absolutely necessary this line is the logical one to follow.

The plane of illumination, that at which the required intensity should be found, is commonly taken at 3.3 to 5 feet above the pavement.

A uniform spherical distribution is bad for the purpose of street lighting, and the practical question regarding an illuminant for such use is, how much of its effective flux of light can be conveniently turned downward upon the street. Light above the horizontal is not wasted. It does great service by illuminating buildings. A radiant for street lighting should, however, be judged substantially by the lower hemispherical intensity. Reflectors of diffusing balls, or glass, are useful with all varieties of street lamps, merely for the purpose of diffusing the light and to send it in useful directions.

In thickly built up important streets the enormous light flux from powerful light sources is so useful for the general purposes of illumination that it pays to employ them. In streets requiring only moderate illumination, particularly streets hung low with shadowing trees, the small light, which for efficient use must be hung rather low, is to be preferred. In streets of the third-class, where every effort is being made to make little illumination go a long way in point of usefulness, the small unit is imperative.

As a rule, all illuminants in American practice are mounted lower than they ought to be; that is, lower than the point at which the form of distribution curve is utilized to the best advantage. Powerful arcs or equivalent gas lamps should be mounted at least 26 to 33 feet above the pavement, and with the very large units, 44 to 66 feet. Lamps of the type of the larger incandescent electric units and the

corresponding gas lights should be about 17 feet high for economical results.

Good street lighting provides an abundance of agreeable light where it is needed, and the equipment with which it does this should add decorative effect to the appearance of a street.

It makes money for a city, by adding to its attractiveness, increases its trade, and advertises it to the people of other places without special additional expense.

On the other hand, a poor system of lighting is wasteful, as well as useless. Nearly all of its cost is a loss.

Wherever there are intensely bright light sources, without proper glass or globes, the effect is dazzling. The pupil of the eye unconsciously contracts to protect the eye against the injurious effect of this piercing light, and this makes seeing almost as difficult as does the lack of light, and much more painful.

Good illumination gives an even illumination all over the street, on footway and roadway, without any shadows. Concentrated efforts should be made to eliminate glare in one spot and darkness or shadows in another.

One must not overlook the fact that ornamental poles may be used in connection with gas street lighting systems as well as electric. Classic ornamental street lighting poles ornament the streets in the day as well as night, and the general appearance of the street is very materially affected by the handsome iron standard of classic design.

It might be that a city had installed a section of street lighting system, and at a later date would see fit to increase the illumination. This can be accomplished in three different ways:

1. To install more posts.
2. To increase the size of the units.
3. To increase the number of arms on the post, which should be so constructed as to permit of a change of this kind.

[Official Report.—Continued from Page 211.]

FIFTH ANNUAL MEETING, INDIANA GAS ASSOCIATION.

Held in the Claypool Hotel, Indianapolis, Ind., March 12-13, 1913.

First Day—Morning Session.

The President—We will now have the other paper by Prof. Mathers, prepared jointly by the Professor and Mr. Ira E. Lee. The Professor then read the following, entitled,

DETERMINATION OF HYDROGEN, NITROGEN AND METHANE IN GAS BY COMBUSTION IN A QUARTZ TUBE.

The purpose of this research was to devise a more convenient and a more accurate method for the determination of hydrogen, nitrogen and methane in gas. Many different methods have been advocated for making this analysis.[1] The combustion of these, gases by explosion with oxygen in an explosion pipette, was the method generally used until a few years ago. Results with this method in this laboratory have been very unsatisfactory. The difficulty had been that the gases were not completely burned. This gives a result for nitrogen which is too high and causes the gas to appear worse than it is.

A much better method employs the Winkler-Dennis pipette, in which the gas residue is treated with an excess of oxygen in the presence of a platinum spiral which is heated to redness by a current of electricity. This method, we think, gives accurate results when all of the conditions are favorable. The great difficulty is in fastening the spiral in such a way that no metal except platinum is exposed to the action of the hot oxygen. Base metals such as iron are readily oxidized by the oxygen. This introduces a serious error into the work. If the platinum wire for electrically connecting the coil is sealed through glass at a point near the heating coil, the glass at the joint is almost certain to crack. In most forms of the apparatus, the platinum spiral is fastened to stout iron wires which are inclosed in glass tubes. These tubes enter the pipette through holes in a rubber stopper. A cement is used to make the iron wires in the glass tubes gas tight. This form of apparatus would be satisfactory if platinum wires were used in the place of the iron wires, but this is too expensive. The ends of the iron wires in the pipette are oxidized during each combustion. This error increases the percentage of hydrogen and lowers the percentage of nitrogen. A modification of the apparatus, as devised in this laboratory, overcomes these objections and difficulties. Two short pieces of platinum wire were sealed into the ends of two glass tubes. The platinum spiral which was to be heated was fastened to two platinum wires which were then thrust in the open ends of the glass tubes. These wires extending into the glass tubes were bent into wavy shapes, so that they would be held in position by contact with the sides of the tubes. When the pipette was filled with mercury, these glass tubes were filled (and remained filled) with the mercury so that the electrical connection was complete from the outside platinum terminals through the platinum spiral. The places where the platinum wires were sealed in the glass were so far from the heated spiral that there was no trouble with cracking. A platinum spiral, made by twisting together several very small platinum wires, lasts much longer than a spiral made of a single platinum wire. The spiral must be smaller in diameter than any of the other pieces of platinum which are used. This apparatus gives correct results when properly manipulated.

One source of error is always present in all combustion over mercury. If the spiral is heated too hot, the mercury is oxidized, while if the temperature is so low, that there is no danger of oxidizing the mercury, the combustion of the gases will be incomplete. The Drehschmidt method[1] avoids this error since no mercury is present during the combustion. This method of burning the gas residue mixed with oxygen, by passing it through a hot platinum capillary tube, is perhaps the best scheme. However, the high cost of the platinum capillary tube, together with the rapid deterioration of the apparatus, makes a modification desirable. The experiments described in this paper show that the quartz tube filled with pieces of scrap platinum is an entirely satisfactory substitute for the platinum capillary tube in the Drehschmidt apparatus.

The quartz tube was 30.5 cm. long, 7.25 mm. outside, and 3.38 mm. inside diameter. Its volume, determined by the weight of mercury required to fill it, was 3.317 cc. The platinum scrap, which was used as a contact substance in the quartz tube, was prepared by cutting pieces of ordinary scrap platinum wire, which every laboratory has in quantity, into as short pieces as possible with shears. These small fragments were then placed upon stiff paper which passed through a cornet roll mill a number of times. These flattened pieces of platinum presented a large surface to the passing gas, and at the same time offered very little resistance to the passage of the gas. Two pieces of scrap platinum gauze were used, one in each end of the quartz tube, to keep the small pieces of platinum in position. The platinum weighed 11,189 grams, and had a volume of 0.522 cc. The platinum occupied 21.6 cm. of the length of the tube.

The data concerning the many preliminary experiments, which merely served to detect the errors, will be omitted. The following form of apparatus and manipulation were found satisfactory.

A mercury pipette, holding the gas to be burned and the oxygen required for the combustion, was connected to one end of the quartz tube by a suitable capillary tube with rubber connections. A mercury burette, arranged to receive the gas, was connected to the other end of the quartz tube in a similar manner. Pinch-cocks, one on the burette and one on the pipette, controlled the connections with the quartz tube. The burette was provided with a water jacket, which was connected at its lower end with a level bottle, so arranged that the water could be drawn out and then passed back into the water jacket. This circulation and thorough mixing of the water were necessary to prevent unequal temperatures between the top and bottom of the burette. The water jacket was improvised from the outside part of a Liebig condenser. A thermometer, which showed the temperature to the water and gas, was suspended about midway of the burette inside of the water jacket. The quartz tube was heated by a bunsen burner provided with a wing tip which produced a broad flame. An asbestos board was suspended about 5 mm. above the quartz tube, to lessen the radiation of heat. The manipulation was: The temperature of the gas in the pipette, that is—the temperature at which it was measured—was carefully read. The pinch-cock connecting the burette to the quartz tube was opened and the burner was lighted for 3 minutes. The increase in volume of the air in the quartz tube produced by the heat, was cared for in the burette. The pinch-cock connecting the pipette to the quartz tube was opened and the level bottle was raised so that the gas and oxygen passed slowly and regularly over the glowing platinum, generally about 3 minutes being required. In no case was there any indication of an explosion in the pipette, even when the velocity of the gas was greatly in-

1. "Review of Progress in Gas Analysis," "Chemiker Zeitung," 32, 601 and 617 (1908).

1. Hempel-Dennis, "Gas Analysis," page 140.

creased. The level tube on the burette was raised and the level bottle on the pipette was lowered so that the gas was forced back from the burette into the pipette. The gas was then again passed through the quartz tube over the glowing platinum into the burette. The flame and the asbestos board were removed and water was poured upon the quartz tube to cool it. After the quartz tube had reached room temperature, the pinch-cock connecting the burette and quartz tube was closed. The mercury in the burette and level tube was leveled. The water in the water jacket was passed back-and-forth by means of the level bottle until the thermometer in the water jacket showed constant temperature. The mercury in the burette and level tube was again carefully leveled and the volume of gas was read. The final gas volume was always corrected for variation from the initial temperature.

The process as described above was tried with pure hydrogen gas, which was prepared by the action of boiled dilute sulphuric acid upon pieces of zinc contained in a gas double pipette for solids. The pipette was filled with boiled distilled water to displace the air. The sulphuric acid was added through a glass tube which entered through the opening for the introduction of solids into the pipette. The hydrogen gas was allowed to escape completely from the apparatus several times before any was saved for analysis. This form of generator very effectively protected the hydrogen gas from the diffusion of air. The results are given in the following table:

Hydrogen Used.	Air Added.	Volume after Combustion.	Time of Experiment.	Total Experimental.	Contraction Theory.
26.02	90 6	77.6	2.5 minutes.	39.03	39.03
21.06	77.9	66.75	2.3	31.6	31.59
20.4	77.9	67.7	3.5	30.6	30.6

The following table shows the results which were obtained in the analysis of gas residues:

Residue cc.	Oxygen cc.	Volume after Combustion.	Time.	Total Contraction.	Carbon Dioxide.	Hydrogen.	Nitrogen.
51.9	80.4	50.2	.	82.1	18.8	28.4	4.7
52.3	71.3	42.4	3	81.4	17.5	29.4	4.25
58.73	67.18	38.0	2	81.34	17.77	29.0	3.9

The result in experiment 1 was obtained with the ordinary combustion pipette. This value was taken as the standard. Experiment 2 in the table shows 17.5 per cent. of carbon dioxide, which was, of course, obtained by the absorption of the carbon dioxide which was in the burette. This value must be corrected for the amount or carbon dioxide which remained in the quartz tube. The total gas residue after combustion (including the air originally in the quartz tube) was 42.4 plus 2.795 (the volume of the quartz tube which was unoccupied by platinum) which was 45.195. So, 93.8 (42.4 — 45.195) was the per cent. of the gas which was measured in the burette. The carbon dioxide in all the gas after the combustion was 17.5 — 93.8 or 18.65 per cent. All carbon dioxide readings were corrected in this manner. The variations of the results in experiments 2 and 3 from the standard in experiment 1 are small and perhaps due to changes in the gas, since the three experiments were made on three successive dates. To avoid this variation from day-to-day, several gas residues were prepared for analysis one afternoon, were mixed in a water pipette and portions of this mixture were used for analysis. The results are:

Residue.	Oxygen.	Volume after Combustion.	Time.	Total Contraction.	Carbon Dioxide.	Hydrogen.	Nitrogen.	Methane.
49.92	68.8	41.5	2.0	77.22	18.65	26.6	4.69	18.65
49.95	68.9	41.55	3.5	77.3	17.45	26.65	4.64	18.66
49.90	68.9	41.6	3.5	77.2	17.6	26.5	4.7	18.70

All of the results given in the tables show that the quartz tube is as accurate as the combustion pipette. It was found necessary to pass air through the quartz tube to remove the carbon dioxide produced by one experiment if another experiment were to be made at once. If only total contraction was desired the carbon dioxide did not need to be removed. If nitrogen was to be determined the gas remaining in the tube from previous experiment had to be removed by passing air.

This apparatus gave an excellent method of determining the total nitrogen in gas. The gas was mixed with an excess of oxygen whose nitrogen content was accurately determined. After combustion in the quartz tube, the gas was passed into potassium hydroxide to take up the carbon dioxide, and alkaline pyrogallol to take up the excess of oxygen. The unabsorbed residues consisted of the nitrogen in the gas and the nitrogen which was in the oxygen. The results are as follows:

Gas.	Oxygen.	Nitrogen Added in Oxygen.	Total Nitrogen.	Nitrogen in Gas Taken.	Nitrogen. Per Cent. in Gas.
49.9	76.4	7.10	8.68	1.58	3.17
50.0	74.05	6.95	8.62	1.67	3.34
49.93	78.04	7.19	8.78	1.59	3.20

Other tests showed that under the conditions of the experiment less than 67.7 of the oxygen (63.4 cc. of pure oxygen) did not give complete combustion with 50 cc. of the gas. This was 12 cc. of pure oxygen in excess.

Since the work which is described in this paper was completed, Hempel, a German authority on gas analysis, has published[1] the same method, except that he heated the quartz tube with a blast lamp. He also described an arrangement for heating a platinum spiral inside a quartz tube with electricity. Electrical connections were made by sealing platinum wires into glass capillary tubes which were then attached to the quartz tube by rubber tubing. Hempel says that the older methods of burning the gas were never accurate because the temperature of the platinum spiral was never high enough. He thinks that these methods which use the quartz tubes (or the platinum capillary) are the only ones which give accurate results.

After considering all of these results, one feels that the older methods of determining hydrogen, nitrogen and methane are about to be supplanted by a new and more accurate method.

Summary.—Gas residues after the addition of oxygen gas were burned by passing them through a heated quartz tube which contained pieces of scrap platinum. The results are very accurate. The advantages of this apparatus over the standard combustion pipets are:

1. The quartz tube and pieces of platinum are not easily broken or damaged during use. The quarz tube is brittle, but will break only if struck a blow. The combustion pipette is very easily broken and the small platinum wire often burns out even when great care is exercised by the operator.

2. No metal or other substance which can be ozidized or acted upon by any of the gases is present in the quartz tube during the burning. In the combustion pipette mercury, an oxidizable metal, is always present. In some of the experiments during the research, the conditions were such that very serious errors were made by the absorption of gases by the mercury. Everyone is familiar with the formation of oxides upon the mercury and upon the sides of the combustion pipette.

3. Small cracks in glass tubes, or leaks around the rubber stopper or places where glass tubes enter in the combustion pipettes, cause serious errors. There is very little chance for leaks in the quartz tube apparatus.

4. Platinum scrap, such as short lengths of wire, which we generally plentiful in laboratories, is used in this apparatus. The quartz tubes are cheap.

5. The temperature in the quartz tube may be made high enough to insure complete combustion of the gases.

The disadvantages of this new process are:

1. The gas becomes heated during the combustion, so care must be taken to determine the final temperature at which the gas is measured. Corrections must be made for all temperature changes.

2. A correction must be made for the carbon dioxide which remains in the quartz tube after the combustion. This advantage can be overcome perhaps by the use of a smaller bore capillary quartz tube in which the volume is so small that a correction is unnecessary.

Discussion.

The President—Gentlemen. I desire to again emphasize the fact of our wish to encourage Prof. Mathers to keep on with his good work. We should make it a point to add a few words to what I have already said to the Professor. Will Mr. Thwing start the discussion?

Mr. Thwing—There does not seem anything to discuss in this comprehensive paper, which thoroughly covers the subject. The fundamental idea of a discussion is to disclose either fault or flaw in the statements of the speaker, so in this case I feel unable to detect any flaws.

A Member—I would ask the Professor whether, in the development of the residue, he considered simply and merely hydrogen, nitrogen and methane, or whether he also considered the methane. The custom of the companies now is to determine both methane and ethane, and a good many errors occur in determining heating values of gas through failure to do this.

1. "Zeitschrift fur Angewandte Chemie," 25; 231 (1912).

Prof. Mathers—Two errors, occur if you do not determine the ethane, but as these almost balance themselves, it does not amount to much in the end. In other words, they correct themselves. We do not make that determination; in fact, we do not consider that a part of this.

Mr. Graf—Perhaps this may be foreign to the subject, but I would like to ask the Professor a question. Many times the matter comes up concerning the best way of getting samples of gas for analysis. Take particularly the small companies which, lacking laboratories, want to know what they are doing in respect of B.T.U.'s and the constituents of the gas which they are making. What would be the best way for them to obtain samples of gas for analysis? In other words, I have been under the impression that an analysis made on the ground is generally more successful than one over which you have to get as a sample and send it to a University to be analyzed.

Prof. Mathers—In the samples sent to the University of course it is necessary to calculate the heating power instead of a determined value. The way to collect the gas is to have a tube perfectly dry, carrying two valves through which the gas is allowed to pass for a considerable time until all the air is out. Then those valves are turned off and the tubes are set in. As far as analysis is concerned the results are very good, unless the valves are not closed tightly. In those cases probably a little error will creep in. It is possible to approximately correct the amount of air in there. That would not be considered the accurate way to do it. It would be better to get a sample having no air.

A Member—I would ask Prof. Mathers if there is any error in the apparatus by which the moisture in the air might influence the analysis in the quartz tube?

Prof. Mathers—Do you mean, would the moisture of the air decompose in the same way? I do not think it would. I probably should have mentioned that there is a so-called Drehschmidt method, fitted with a capillary tube made of platinum, that heats and passes the gas through it; but it is a very expensive apparatus, and difficult to get it repaired. This really, as the paper says, is a substitute for this Drehschmidt platinum capillary tube,

Mr. J. W. Dunbar—Mr. President, I am sure it has been a source of great pleasure to all of us, as well as profit, to have had Prof. Mathers with us this morning, who has given us the benefit of his research and knowledge and experience with reference to the preservative qualities of water gas tar, and also of his new method of determining the hydrogen, nitrogen and methane in gas. Feeling we have been especially favored on this occasion, I, therefore, move a vote of thanks be extended to Prof. Mathers, with full assurance that his efforts in our behalf are appreciated. Also that Messrs. Lee and Moncrieff be included in that motion. [Seconded and adopted.]

An adjournment until 2 o'clock was ordered, at which time the members were to attend the exhibit of industrial gas appliances in the premises, No. 37 South Pennsylvania street, at the instance of the Indianapolis Gas Company.

SECOND DAY—MORNING SESSION.

The President—The first paper on the programme is that by Mr. G. M. Dolley, of Logansport, whose topic is

MOTOR TRUCKS.

In writing this paper on the efficiency of the motor truck for the distribution department of the gas business, a word of explanation and apology is due as to the limited information contained, for it was necessary, owing to my limited knowledge of the motor truck, to obtain practically all information from outside sources. My personal experience with the motor truck is that it is not practical in plants where only one horse and wagon are required for the work in the distribution department.

A truck, with the proper management, should do the work of two or three horses and wagons. It is necessary to have a driver to operate the truck who is thoroughly familiar with the workings of the machine, so that, at any time the machine gets out of order, the driver can repair it without the expense of taking it to the garage. It is also necessary that a truck be given the proper care, and at least one half day each week should be devoted to general cleaning and oiling all parts, including engine and gear. Too much stress cannot be put on the instructions to the driver to keep his machine in working order, as it is one of the most important things in holding up the efficiency and prolonging the life of the truck.

It is up to the driver to keep the truck in repair and out of the repair shop. To avoid this he must oil his car every morning and be sure that all parts intended to be oiled get proper lubrication. Taking the motor first, which is the most important part of the truck. The driver should exercise the best of care to see that all nuts, bolts, or any part which may have a tendency to work loose, are perfectly tight before starting out in the morning. A motor can easily be ruined by the driver neglecting to fix such parts as need his immediate attention. An experienced driver can observe a knock or any unusual sound that might occur while running. At times a driver gets 15 to 30 minutes while waiting to move a man, and that gives him time to adjust or fix anything that might need his attention, as 15 minutes will accomplish a great deal toward keeping the truck in repair.

Another very important point in the care of the truck is to see that it is never loaded above its rated capacity, or driven at too high a speed. It might seem that it would be all right to put a load of 2 or 3 tons on a truck, even if the rating capacity is only 1 ton. One might argue that the excessive depreciation which is the inevitable result of overloading, is as much the business of the owner as insufficient lubrication or other neglect. This, however, is not true. A man who overloads his truck, driving it over the public highways, jeopardizes public safety in exactly the same proportion as he exceeds the rated loading capacity of the truck. The reason for this is that the brakes on each vehicle are designed to absorb a certain momentum; that is to say, to nullify the dynamic energy of the moving body by changing it into friction and heat. A certain momentum, that is, the power used for driving the truck at a certain speed, may be absorbed, and no more. If the truck is driven above that certain speed, the brakes will not be able to hold and act as they should.

The most efficient method of operating a truck for the distribution department in my experience is: First, to have a driver who has some knowledge of piping, then to furnish each fitter with a complete kit of tools. The foreman after sorting the orders turns them over to the driver, the driver loads the material necessary for the work on the truck, and, with the fitter who is to do it, proceeds to the job. After each fitter is placed, the driver should know about how long it will take to do the work, so that, when it is completed, he should have the material ready for another job, get the fitter and tools and take him to the next one. In this way one truck and driver can take care of at least six or eight fitters. In some cases, with the right kind of a driver, he could also be utilized for inspecting work done by the fitters.

There is no doubt in my mind, but that the motor truck will eventually come into general use by the gas companies, displacing the horse. It will be sometime before the smaller companies will find it to their advantage to replace the horse with the truck owing to the cost of installation and operation; but with the progress that is being made in the manufacturing of trucks, it will not be long before the smaller companies will fall in line and find that they will be able to get their work out to better advantage with the truck than with the horse. Regarding the difference in cost of operation between the motor truck and the horse, it is imporsible at this time to give accurate figures, for the reason that at the present time there are only eight companies in the State that are using trucks, and these companies were not in a position to give any conclusive figures on the operation. In reply to circular letters sent out to these companies we received data from only three, balance of five were unable to give any information. I have also obtained data from several companies outside of the State. The complete list is given in the table.

In conclusion, I wish to thank the members who contributed data for this paper, and trust, by the next meeting of this Association, we will be able to get more complete information for the use of the members, as I think the motor truck is one of the important subjects that will demand careful consideration in the near future.

Discussion.

The President—This is a very interesting subject, and one on which we should have a full discussion. Those who are operating motor trucks and those who are still using the horse wagons should be able to secure a lot of information why they should use trucks. We would like to hear from any one on this subject.

Mr. Graf—Mr. President, I think Mr. Dolley has given us a great deal of matter in a very small space. We have been operating trucks for the last two years, and every time it came to buying a new one, we were cautioned against the matter of overloading, but I will have to thank Mr. Dolley for telling me exactly why that is objectionable.

Statistics on Motor Trucks.

Trucks Outside of State.	Miles Run.	Gallons Gasoline.	Cost.	Oil Quarts.	Cost.	Tire Cost.	Repairs and Sundries.	Total Expense.	Cost per Mile.	Miles per Gal. Gasol'e.	Number Cylinders.	Horse Power.	Size of Truck
1	2,004	346	$42.30	102	$19.14	$	$11.89	$73.33	$.036	5.8	2	18.	
2	3,000	173	19.61	21½	2.34	.....	90.37	112.32	.037	17.3	4	22.5	
3	3,643	599½	53.27	80	8.69	39.98	15.58	117.52	.032	6.0	2	10.	
4	3,501	640	69.19	174	33.48	.....	74.40	177.07	.05	5.4	2	10.	
5	5,126	610	54.89	181	24.80	159.50	6.53	245.72	.048	8.4	2	20.	
6	3,258	167	14.57	52	6.46	34.94	4.55	60.52	.018	19.5	4	20.	
7	4,246	759	68.09	227	28.18	116.20	102.60	315.07	.074	5.5	2	16.	
8	1,076	147	16.67	36½	4.11	.....	18.50	30.28	.036	7.3	2	10.	
9	1,745	245	26.91	80	8.81	.....	36.82	72.54	.042	7.1	2	10.	
10	9,476	991	94.57	268	30.37	46.50	229.82	401.26	.042	9.5	4	20.	
11	5,801	705	64.16	150	....	51.50	31.25	164.82	.028	8.2	3	15.	
Indiana cars, 6 months.													
12	3,007	332	44.82	132	8.96	.....	51.72	105.50	.035	9.0	..	..	1 Ton.
13	3.381	432	58.32	111	7.54	.....	33.74	99.60	.029	7.8	..	..	1 Ton.
14	4,447	...	....	...	....	.....	....	456.27	.103	...	..	..	
15	5,649	...	....	...	....	.....	....	539.13	.096	...	..	..	
16	4,513	...	....	...	....	.....	....	581.11	.128	...	..	..	
17	....	620	71.80	36	3.44	50.00	3.08	78.22	....	...	..	..	

I never before knew exactly why. The life of the truck, as Mr Dolley says, depends entirely upon the up-keep. I have always said that as to our own business. Wherever we have a small stationary engine we are very careful to set it on a firm foundation, very careful about keeping it clean and oiled, and to have all the nuts and bolts tightened up. Everything is in plain view. With the high horse power motor in the truck we simply let it go, paying no attention to it. Very frequently the men operating the truck do not know the first thing about mechanics, or the principle of the machinery or its operation. I think the whole secret in getting life out of a truck is to keep the machinery tuned up and also in careful driving. I do not know that I agree with Mr. Dolley in his plan of getting the best efficiency out of a truck. Our work is probably different from what it is in the smaller companies, but so many of our stops are not more than five or ten minutes or so that we would be unable to send out any number of men with one truck, in our case we send men with each truck. Both men are capable of doing the work that is necessary, and they both do the work. The head fitter drives the car and we pay him a little more than we do the horse drivers, so as to get him to take an interest in the car. I do not think a truck will do quite the work that would be accomplished by two horses. In our experience the figure is somewhere between 1½ and 2. We have been taking the stand that, if we can get 1½ horses out of one truck, we are warranted in using them, because the facility which the truck gives us in covering the ground is worth the difference. In our case, if I remember correctly, a truck runs an average of 30 miles a day, and I do not think there could be any question that it would cover the 30 miles in less than half the time that a horse can cover it. Even the time of the men sitting in the wagon is quite an item. If you are getting the work of two horses out of a truck and are paying your men 25 cents an hour, or 50 cents an hour for two, there is a saving of $3 to $5 a day in labor alone. Now, as to cost. Mr. Dolley does not state whether his figures include all the items of cost. The matters of gasoline and oil and tire repairs are minor items. The large items are interest on investment and depreciation, and another large item is that of insurance, both liability and fire. If anybody were to start operating trucks on the figures given by Mr. Dolley he would be very much disappointed. With a motor truck, or any kind of automobile, depreciation should be faced at the very beginning, and our policy is to charge off a car absolutely in not to exceed 4 years. You take a car costing $1,600, this means a charge of $400 per year right there. Add liability and fire insurance, which last year cost us pretty close to $100 a car, and you see how insignificant are the items of repair shown in this table. I cannot figure it any other way, if one takes into consideration all the charges against a truck, than that it will cost not less than 15 or 20 cents a mile to operate one; but, even at that figure, considering the saving of time of the men, additional work accomplished and the facility and quickness with which you can get to do the work and attend to calls, I think one is warranted in adopting a motor truck. There is nothing in this table that covers electric vehicles. Of course it is a question in my mind, with the increased price of gasoline, whether we can afford to use gasoline cars altogether. I just want to suggest that, in view of the cost shown in this table, which might be taken by some of our members as a test of the car itself, it would be unfair to publish the names of these types of cars with the figures given. The cars should be represented by numbers, not names. We have had 2 cars of a make mentioned here that do not approximate anywhere near the figures given. I think I can safely say the cost is not less than 3 times as much. It should be the policy of this Association not to advertise any make of car, and it would seem unwise to publish this list as given, so I suggest that the names of the cars be suppressed and numbers substituted therefor, but in any event a member can get the name of the car by referring to the Secretary, or taking this list home with him.

The President—I will call on Mr. McCleary.

Mr. McCleary—I have not any figures with me on the trucks, and I can appreciate Mr. Dolley's efforts to get the figures he has given us. Many different things are to be taken into consideration in getting them. First of all is the locality. There is much in that; then there is the make of the machine generally—cheap, good and expensive makes. Again, there is the difference in the cost of material used; gasoline, of course, in some localities may be a little higher than in others, and some may use a better grade of gasoline, or they may use a poor grade of oil. Further, is the matter of variety in repair men; the latter may be good or bad. In our district, we have two new "Little Giant" trucks (gasoline cars), and we also have a third "Little Giant" which we use for street purposes, but we have none that is employed in carrying around the fitters. One truck used for street work is driven by the main foreman, who takes his men to the different jobs in different towns. We have 5 towns within a radius of 5 miles, and generally get within one square of the locality where the work is to be done. The street truck gives us the best possible service, owing to the fact that the foreman can pick up his men in any section and carry them across to another town, avoiding car fare. Of course, the street car service in these towns is not of the best. You might get a car in ½, 1, or 1½ hours. High pressure leaks require quick attention, and to have our main foreman pick up his men and shoot them off to another town saves not only car fare but liability for damages. Referring to the service cars, I have seen them load 12 men and their tools on a little service car and make that run. One of the cars we call a meter truck, which we use in what we call our outlying districts. It is loaded every morning the same as any other motor truck, and it probably displaces two wagons and does about four times their work? In fact, we find that we can sometimes clean up the work in the outlying districts in 6 or 7 hours and come in to the main distributing point to help the men there with meter connections, shut-offs and turn-ons; also, in smaller jobs, such as connecting up stoves already on the premises and taking care of the small leaks. Also, we have a storeroom truck, which we use for short, light deliveries, in the towns and also in the outlying districts. Our system being a combination gas and electric plant, of course, we use it for both sides, delivering small transformers, small coils of wire, cross-arms, gas stoves, pipe, etc. It is so arranged with a false

bottom, which is greatly more a secondary bottom than anything else. That is, there is the body of the truck with its bottom, and about a foot above is a secondary bottom which can be removed. The idea is that 6 stoves of the single-oven class can be stacked on that secondary bottom, and underneath we can store anywhere from 12 to 20 fitting boxes to go out with these stoves, or whatever appliances are taken out. We can get at these boxes without touching the stoves. I have no figures here to prove anything, but I can say that, over our horse hire costs, we save in the neighborhood of $100 to $200 a month. We have a few old horses, and when it comes to getting heavy material from freight houses and other places, we hire teams to handle that stuff; but we can send our truck to the station to remove any sort of material. Occasionally, if you want material in a hurry from the station you have to depend on hired teams. You can hire a team in the morning and you may get it about four in the afternoon, whereas, if you have a motor truck at your service you can call on it no matter where it is and have it go right after the stuff, which speed often means a saving of much money. I do not know how using the truck for fitters would work out. I think there would be considerable loss of time unless it was a large city, with no gaps between the houses. Going out with 6 fitters you scatter them along and return to pick them up, and as it often happens in small towns, a fitter may be in the east end and another in the west end, which means a considerable loss of time. In our case, where a fitter stops off on a job and couldn't get in, or perhaps the party didn't want him to do it that way, this would keep him from going ahead with his work. In the meantime "hanging on the job," he would wait for the truck to come around and pick him up; but if anything happened to it, or say the truck had 3 or 4 other trips, all that time was wasted. The idea is to keep a truck going, getting all the service you can out of it. Making deliveries, I think, is about the best thing for which you can use a truck, outside of setting the meters, although, I say, in a large city it may work perfectly well.

The President—With us this morning is one who should be able to tell us why we ought to put in motor trucks. Will Mr. George Drake Smith say a few words on this subject?

Mr. Smith—I am interested in the truck trade not the gas business. The General Manager of our Company, now lives in Chicago, and many of you are acquainted with him, for he has had long experience in the gas business. I have listened with much interest to what has been said by Messrs. Dolley, Graf and McCleary, and as there is so much to the subject I wish the Chairman to call me down if I take up too much time. It has for a long time been a question, how am I, as interested in the gas business, going to procure any absolute, tangible figures that will tell me what it will cost to operate a gas or an electric car, or horses. Will I keep on using my horses; shall I buy gas cars; or shall I buy electric cars? The Massachusetts Institute of Technology has been engaged for a long time compiling figures from all over the United States on the cost of operating the horse wagon, the gas car, and the electric car. Of course, these figures are very much in favor of the cost of operation of the electric, because the electric car or truck, if properly operated where electrical current can be had at a minimum or fair price, is much cheaper to operate than the horse or the gas car, if operated within the scope that it should be. For instance, a gas car has its uses, and it is almost a necessity for most every business, on account of the speed first, the necessity to get on the job quick, quicker than the electric or the horse, and the fact that it gives any amount of mileage, because you can pick up gasoline where you could not get electricity or another horse—the horse cannot go fast enough, of course—is another advantage. When I arrived here yesterday one of the first things I saw down at the depot was a car of the Adams Express Company—23 electric cars have been running on the streets of Indianapolis for 8 years. I speak of this as evidence of dependability. If, as Mr. Graf says, they charge off depreciation after 4 years with the gasoline cars, then that is a point for the electric cars. In Cincinnati the Company has some in service for 11 years; it has 8 trucks that have been running 9 years, and 8 electrics that have been running 8, 9 and 10 years. So, you go through the whole entire category and find people running electrics. The dependability of the electric, the fact that it does not wear out as quickly as the horse or gas, makes it, within the scope in which it will operate, the best car to operate. I was sent West by the Company I represent—I am not here to sell the goods, but I am here by invitation—and was surprised to find that in some places they were operating as many as 250 cars in a fleet, in another place 112; one brewery had dispensed with all its horses and used electrics, because of short hauls; and a piano company that dispensed with 300 horses is doing its work with 65 electrics. The cost of gasoline advanced since 1905 several times, while the cost of electrical current has decreased. Many of you have as a by-product electricity, and many of you operate electric companies in combination with gas. You know what current costs, and you know you can put the juice into the car after you take off your big loads at night with little, if any, cost. Mr. Graf spoke of sending out 2 men with a car. Here in Indianapolis the Adams Express Company is running 23 cars. It sends out 1 man, who is really a boy, since a mechanic is not needed to operate an electric truck. Let me conclude by stating that the cost of operating (as Mr. Graf said) Mr. Dolley has given does not include interest on investment, or allowance for depreciation, insurance from fire and liability; but I have here a statement from the Massachusetts Institute of Technology, and if you gentlemen will write to the Massachusetts Institute of Technology (a disinterested third party) the figures will be forwarded by that Institution. Basing cost at the highest for everything, the cost of the electric per day is figured $7.55 for a 1,000-pound car; the gasoline car figures at $9.23; and for a horse wagon, $5.90; that is (with 2 horses) the cost for delivery. These reports have been obtained from all over the States. The speed which the gas car is capable of making is figured at 80 miles a day; 40 miles for the electric, and 30 miles for the horse, in this report made up from all parts of the country. I think you will recognize that it is one of the best Institutes in this country, and I do not think any Institute in Europe excels it in capacity or scope. The actual mileage covered was 35 (average) for the electric; 38 for the gasoline and 25 for the horse. Of course, that means the gasoline car is to be laid up a whole lot. The gas type has its uses, for it is a truck you must all get if you desire speed or wish to cover long distances. The electric truck at the most will make about 50 miles a day. One can make 50 miles a day nicely on one charge, and you can depend upon it daily, if you have the right car and the right batteries; but the main thing is—you are in business to stay—the cost of operation, if a trifle less all the time, is of very little importance in comparison with dependability. Which can you depend on the best? Which can you get the best service out of? In closing I wish, being interested in the truck business, to thank Mr. Dolley for two things he said, which are of inestimable value to anyone operating any make of truck or car; and I hope you will remember that, in reading this paper, you have had a very valuable suggestion made to you that you never should forget. The first thing is on the care of the truck, to be sure that your care for it right; the main thing is on the speed. We, as a company, do not speed up our trucks and will not have anyone do so, for it increases the cost of operation and makes the liability too great on the part of the consumer. In Dayton, O., the National Cash Register Company has one of the ablest groups of engineers in the United States. Recently, in operating some small industrial trucks, the question came up as to liability. They said it was not cost so much if, first, they had dependability; this they had to have; the next thing was liability. They killed two men last year in running 700 small hand trucks. They run from one plant to the other, down a 15, sometimes a 20, per cent. grade over a trifling hill and up again. Two men pushing these hand trucks lost their lives. The question was how could they brake those cars to stop at once and reduce the speed of that car. Well; we did both. Again, we have a little truck for that purpose, constructed so that if the operator loses his senses and falls off the truck, the current is shut off and the truck goes on. Keep down your speed and take care of your cars. Doing these things, you can operate either gas, electric or horse.

The President—We are very glad to have had Mr. Smith's views on this operation. Personally I am very much interested in respect to finding out something about electric trucks. We operate one small truck in the ice department, and find the electric type is the best kind of motor truck we can use for that purpose. We would like to hear from anyone else on this subject.

Mr. Battin—Right in that connection, I am very glad to have Mr. Smith with us. I would like to ask him whether the electric truck is applicable to the light delivery wagons we use? Nearly all the papers read before our Association have reported favorably over the electric truck as compared with the gasoline type. The companies in all large cities are rapidly discarding gasoline cars for electric ones. In all these cased, it may be noted these cars are of the heavy, slow moving pattern, used for large loads. Our business needs the opposite, requiring a comparatively light, rapidly moving car that will easily cover long distances, without breaking down or having to be repaired.

(*Continued on page* 226.)

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NEW YORK, MONDAY, APRIL 7, 1913.

PUBLISHER'S ANNOUNCEMENT.

The resignation of Mr. H. Thurston Owens from the editorial staff, to enable him to assume managerial control of the La Crosse (Wis.) Gas and Electric Company, occurred some weeks ago. In the instance of naming a successor to Mr. Owens the Publishers are happily enabled to inform their readers that they have secured the services of Mr. Sanford K. Campbell, of Hempstead, N. Y. Mr. Campbell, who is quite well-known to the gas fraternity, especially to those in the Middle and Eastern States, is a graduate of the University of Pennsylvania, Department of Civil Engineering. His first actual service along this line was with the Northern Pacific Railroad, in its Maintenance of Way Department; then Superintendent of Construction, Philadelphia Division, Standard Oil Company. His next service was with the Norfolk and Western Railroad, as Inspector in the Supply Department thereof. He then engaged with the Paterson and Passaic (N. J.) Gas and Electric Company, and shortly after that Company was merged into the other properties of the Public Service Company, of New Jersey, he was appointed Local Manager of the Company's Central Division, with headquarters in Plainfield, N. J. In 1906, Mr. Campbell was appointed Engineer in charge of the Nassau and Suffolk Lighting Company's plants in Hempstead and Freeport, Long Island, with headquarters in Hempstead. His course there is well-known to the fraternity of this vicinity, for shortly after his original appointment he was appointed General Superintendent of the corporation. Mr. Campbell is a gas engineer fully up to current practice, and has no inclination towards revolutionizing things, although fully equipped to lead should occasion arise. He is a member of the American Gas Institute.—A. M. CALLENDER & CO.

[Official Notice.]

Fifth Annual Meeting, Southern Gas Association.

Office of the Secretary,
Southern Gas Association,
Atlanta, Ga., March 29, 1913.

To the Members: The Fifth Annual Meeting of the Southern Gas Association will be held in the Selwyn Hotel, Charlotte, N. C., Wednesday, Thursday and Friday, the 16th, 17th and 18th days of April, 1913. The list of papers to be contributed for discussion is as follows:

"Practical Demonstration," by Mr. McD. Dexter.
"Selling Domestic Appliances," by Mr. G. W. Howsmon.
"Industrial Appliance Campaign," by Mr. Porter.
"Management of Medium Size Gas Properties," by Mr. Carr, Raleigh, N. C.
"The Present Outlook, with Future Prospect, of Gas Plant Residuals, with Particular Reference to Tar," by Mr. S. R. Church.
A paper, by Mr. R. C. Congdon, Atlanta, Ga.

The Charlotte Gas and Electric Company is making every possible effort to have this meeting returned as the greatest in the history of the Association; and, from personal assurances, volunteered all along the line, the attendance will be large and representative. There will be no reduction in railroad fares, and you must make your hotel reservations, through Mr. Henry Collins, Chairman Hotel Committee, Charlotte, N. C.

The entertainment programme will be announced later.

Truly yours, T. D. Brewer, Secy.-Treas.

[Official Notice.]

Fifth Annual Meeting, Pennsylvania Gas Association.

Pennsylvania Gas Association,
Office of the Secretary,
West Chester, Pa., March 1, 1913.

The Fifth Annual Convention of the Pennsylvania Gas Association will be held at York, Pa., on Wednesday, Thursday and Friday, April 9th, 10th and 11th, 1913. The headquarters will be at the Colonial Hotel. The Committee requests a prompt reply on the inclosed postal, that reservation may be made for each member attending the meeting. The papers promised are:

"High Pressure Distribution," by Mr. C. M. Cole, Harrisburg, Pa.
"Valuations of Gas Companies for Rate Making," by Mr. Grier Hersh, York, Pa.
"Industrial Gas Appliances," by Mr. E. C. Romain, Reading, Pa.
"Gas Company Classification and Accounting," by Mr. J. Wittaker, Fernley, Philadelphia, Pa.
"Demonstration of the Use of the Pulmotor," by Mr. Conner, Philadelphia, Pa.

In addition to the above papers there will be the following list of topics for discussion: "Selling Campaigns," "Lighting and Heating Appliances," "House Piping," "Advertising," "Meeting Competition," "Methods of Handling Orders in the Office," "Methods of Handling Merchandise Orders, Office to Shop," "Educating Order Men," "Prepayment Meters," "Waste Heat Boilers," "Coal Gas," "Photometry and Calorimetry in Small Works," "Checking Work Done by Order Men."

Entertainment.

Wednesday Night.—Theater party.

Thursday—Trip to Gettysburg battlefield as the guests of the York Gas Company.

Friday Night.—Informal dinner and smoker. Tickets for theater and dinner-smoker, $5.

The members are requested to return postal card notice to Mr. Philbrick, at once, that, with your help thus rendered, the work of the Committee may be successfully carried out.

W. O. Lamson, Secretary.

[Official Circular.]

International Gas Congress, San Francisco, Cal.

Under date of March 22d, Mr. Henry Bostwick, Secretary of the Pacific Coast Gas Association, issued the following circular respecting the status of matters in connection with the Association's relation to the International Gas Congress, to be held in San Francisco, in 1915; also, referring to other happenings connected with the ordinary work of the Association.

Pacific Coast Gas Association,
Office of the Secretary,
445 Sutter St., San Francisco, March 22, 1913.

To the Members of the Association: It is with extreme regret that I have to announce the death of our President, Mr. Henry E. Adams, of Stockton, Cal., on March 12th, 1913, due to a stroke of apoplexy; in view of which fact Mr. C. S. Vance, Vice President, of Los Angeles, Cal., will take up the reins of the Association.

The authors of the papers to be presented at our 21st Annual Convention, which will be held at San Jose, Cal., in September, are already at work, all of which will be of interest to the fraternity at large.

It might be opportune at this time to state that the Degree of Gas Engineering has been finally incorporated in the curriculum of the University, and our Mr. John A. Britton and Mr. E. C. Jones are at present engaged in giving a series of lectures before the students in connection with the same.

At this time there are no new developments to report in connection with the International Gas Congress to be held in 1915, except to say that the same is receiving attention at the hands of the Committee of the American Gas Institute, the success of which even at this early day is already assured.

Our Experience Editor, John Clements, of Pacific Gas and Electric Company, Oakland, Cal., and our Wrinkle Editor, H. M. Burkhart, of the Southern California Edison Company, Los Angeles, Cal., will be glad to receive contributions from all members in so far as their respective departments are concerned.

Our Novelty Editor, Mr. H. P. Pitts, of the Pacific Gas and Electric Company, San Francisco, will, of course, be glad to receive any suggestions from members in so far as his respective department is concerned. It will be the earnest endeavor of your officers to have our 21st convention eclipse our previous conventions; however, in order to do this they must have the co-operation of members. We should also make every endeavor at this time to increase our membership, and all members should make it a point to call the attention of their associates or other of their acquaintances who are eligible for membership to the good work that our Association has done in the past, and is now accomplishing in so far as the Degree of Gas Engineering at ths University of California is concerned, and the further advantages that can be obtained by them by being in attendance upon our meetings.

Application blanks and copy of our constitution and by-laws will be furnished upon request. Yours very truly,

HENRY BOSTWICK, Secy.

BRIEFLY TOLD.

ALMOST TOO NUMEROUS TO MENTION.—Mr. Louis Stotz, Secretary of the National Commercial Gas Association, has sent us a copy of a booklet, just issued by that body, entitled, "A Thousand Uses for Gas." It gives an alphabetical list of over 1,000 purposes or processes to or in which gas can be advantageously used, with numerous illustrations of industrial installations; and it is a book that every gas salesman should have. It is the first of a series to be published, others of which will be on, "Factory Lighting," "General Illumination," "Window Dressing," etc. As issued, they can be gotten from Mr. Stotz at 10 cents per copy.

PUBLIC SERVICE COMMISSION FOR MAINE.—Governor Haines, in his annual message to the Maine Legislature, says: "While our statutes contemplate some regulation, and the common law undoubtedly clothes our courts with such authority, there is no easy and practical way for the average citizen to get to this question, and the public seems to feel that such a means should be provided. I believe that the time has come when a public service commissioner or court should be established for this purpose.

SOME MASSACHUSETTS LEGISLATIVE ACTION.—The Public Lighting Committee of the Massachusetts Legislature has reported adversely over the following proposed legislative measures: That gas companies shall pay gas consumers 6 per cent. on deposits made with them; that gas companies be prohibited from shutting off the gas furnished to any consumer while there is money left of his deposit with the gas company; that it shall be unlawful to charge for use of gas meter; and for a uniform rate per kilowatt hour for electricity supplied on heat or power account.

ENGLISH GAS WORKERS' AGREEMENTS.—Under the "Conspiracy and Protection of Property Act," of 1874, gas companies and water companies in England are enabled to make contracts for service with their employees, which it is a penal offence to break. Any gas company may insist on its men serving under such an agreement as a guarantee and protection to the public against the very great inconvenience and danger from an interruption of its service. The Liverpool United Gas Company has had trouble with its employees, who are working under a co-partnership agreement. The points at issue have to do with these agreements of service which bind the men not to quit work during certain months.

THE UNIVERSITY OF CALIFORNIA LECTURE COURSE ON GAS.—This great institution, for great it surely is, has inaugurated a series of popular lectures on gas, to be delivered by Mr. E. C. Jones, Engineer of the Gas Department, Pacific Gas and Electric Company. His itineary is arranged as follows:

1. The Manufacture of Coal Gas.
2. Purification of Coal Gas.
3. The Manufacture of Water Gas.
4. Visit by Class to Potrero Gas Works.
5. The manufacture of Oil Gas.
6. Distribution of Gas.
7. Measurement of Gas.

The first two of these lectures have been delivered, and have drawn appreciative audiences. This does not occasion any surprise to those who know Mr. Jones, his knowledge of the subjects and his ability to write and speak forceful English.

SOME EXPERIMENTS WITH MORTARS AND CONCRETES MIXED WITH ASPHALTIC OILS.—In a paper by Messrs. A. and T. Sanbora, reported in the "Proceedings, Amesican Society of Civil Engineers," the authors call the attention of engineers to some tests of oil-mixed mortar and cement, which were held to indicate that concretes and mortars thus mixed with certain percentages of oil, were water-tight under pressures as high as 40 pounds per square inch. From tests made with western asphaltic oils the conclusion quoted is made highly impyobable. The tests showed that concrete mixtures carrying 5, 10 and 15 per cent. of oil, by weight of cement, were more permeable than those without oil. The strength of mortars was seriously affected by as little as 5 per cent. of oil: The absorption of water by mortars under low heads was slightly decreased by adding light oils, and was increased by adding heavy oils.

PHILADELPHIA SECTION, ILLUMINATING ENGINEERING SOCIETY, MARCH MEETING.—The March meeting of the Philadelphia Section of the Illuminating Engineering Society was held on Friday evening, March 28th, in the Pennsylvania Academy of Fine Arts. The ladies were invited to this meeting, and at the dinner, served at the Hotel Walton, 50 ladies and gentlemen were present. Through the courtesy of the Board of Directors the annual exhibition of pictures in the Academy was viewed after the dinner, which inspection proved a very enjoyable feature of the meeting. The sessions were called to order by the chairman, Prof. Rowland, at 8:30 P.M., there being 150 ladies and gentlemen present. After a few announcements were made by the secretary, Mr. M. Luckiesh, the speaker of the evening, was introduced. The subject of the lecturer was "Light and Art." Before starting the demonstration, Mr. Luckiesh stated the following: "There are 3 factors in the lighting of an object which affect its appearance. These factors are direction, quality or color value and quantitative distribution of light. The direction and quantitative distribution are easily varied by varying the position of the source or by the shape of the reflector. The quality of a light is inherent in the source and may be changed by colored glass. In portraiture the desired effect is obtained with soft, diffused light, while tragic expressions require sharp shadows. The direction from which the object is lighted is of importance, as the shadows are thrown in different directions and alter the appearance of the object lighted. The color of artificial illuminants is more yellow than daylight. By some it is thought that artificial light is better than daylight, being more cheerful. Of course, the color of daylight changes during the day; also, the color of all light is more or less changed, due to the objects from which it is reflected. There are a number of instances in artificial lighting, where the quality of light has been controlled to obtain the desired result. One instance of this is in the lighting of the Allegheny County Memorial Building, in Pittsburgh. The importance of direction. quality and quantitative distribution of light are illustrated by pieces of sculpture, architecture and painting. In lighting pieces of sculpture, direction is the most important item, and while direction does not play as important a part in architecture yet the effect obtained can be changed, due to direction of the light. Quantitaive distribution is important in lighting paintings, bringing out parts of the picture and keeping the remainder in shadow. A picture should be lighted by localized units equipped with the proper shades. Quality of light is important in the illumination of colored objects. By directing colored lights on a painting certain colors can be brought out to better advantage. During the course of a day a picture is lighted differently, appearing differently under morning light than under artificial light in the evening. If the light of proper quality is thrown on the picture showing it under the condition in which it was painted, it will appear to better advantage." For the demonstration Mr. Luckiesh had a booth arranged in which there were 14 lights, controlled by rheostats and switches, so that many effects could be produced on the objects to be shown. The first object shown was a head. By throwing on lights in various parts of the booth the expression of the face was changed entirely, so that it was seen that the direction of light plays a large part in proper lighting of objects of this character. The next objects shown were a small relief head and a piece of moulding, the effect of direction was very great on these objects. Some experiments in color theory were now shown. There are two methods used in color mixture, the additive and the subtractive. This theory was demonstrated by means of rotating disks containing different colors. It was seen, for instance, that the subtraction of two complimentory colors equals zero, or blank. The rotation of a disk painted with red, blue and green gives the effect of white.

Color has 3 qualities, hue, saturation and luminosity. A saturated color is one in which little white light is mixed. Luminosity is decreased by adding black. This was shown by means of rotating disks. The theory of color matching was touched upon. Mr. Luckiesh now showed in succession, a colored frieze, a chromo, a number of water colors and an oil painting. By ranging the direction, color and quantitative distribution of the lights in the booth, some very wonderful effects were obtained. The audience was very much pleased with the demonstration, which brought out all the points stated in discussion. Those taking part in the discussion were: Profs. Hoadley and Rowland, and Messrs. Boyd, Hornor, Wilson. The following points were brought out:

Light should come from the direction of the shadows. A person's art gallery could be enlarged by throwing different lights on the same picture, thus obtaining entirely different effects. The binocular or stereoptic effect has not been tried. To obtain the proper colored glass for use in color matching, the bue light, then the excess green, yellow and red rays are cut out in succession, so that the light obtained from a north sky is simulated. The efficiency is cut down so that 15 per cent. of the orighnal light is obtained through the glass. The meeting was one of the most enjoyable ever given. The April meeting of the Section will be a joint meeting with the Philadelphia Section, National Commercial Gas Association. The subject of the paper will be "Industrial Lighting."

SECOND ANNUAL SMOKER, PHILADELPHIA SECTION, NATIONAL COMMERCIAL GAS ASSOCIATION.—"At least 1,200 members attended the Second Annual Smoker and Entertainment of the Philadelphia Section, National Commercial Gas Association, which was held in the Auditorium of the Lu Lu Temple, Broad and Spring Garden streets, the evening of March 27th. It was one of the most conspicuous successes of the organization. Not only did it provide entertainment for the local members, but also for the Superintendents of the various plants of the United Gas Improvement Company, who were attending the 24th annual convention in Philadelphia during this week. A short business session was held previous to the entertainment, with Mr. Thomas R. Elcock, President of the Section in the Chair, on the completion of which a flashlight photograph was taken. The programme consisted of 14 rollicking acts, ably abetted by the Section Orchestra of 20 pieces, under the direction of Mr. Canning Stock. One feature of the entertainment was the distribution of appropriate souvenirs to each member. These consisted of a tobacco pouch, a corn cob pipe, a package of smoking tobacco, a cigar and a box of cigarettes. It is needless to say, some difficulty was experienced in clearing the atmosphere sufficiently as a preliminary to the flashlight photograph.—N."

(*Continued from page* 223.)

Mr. Smith—The best answer I can give is to name some companies using light electric cars. These include: The New York Edison, the Chicago Edison Company, the Philadelphia Light and Power, the Boston Light and Power, and the Hartford Light and Power Companies. I might state numbers of others, through the east particularly, that are operating a small car, say of a capacity of 750 pounds, including the weight of the driver, which will make 50 miles on one charge, which will go 12 miles an hour, or can be so constructed with an expensive battery to go 55 miles on one charge, and 15 miles an hour, but 12 miles is about the maximum. The United Electric Light and Power Company of Greater New York, in which my brother is the first Vice-President and my son the Manager of the up-town branch operating on the upper-West side of New York, has four 750 pound cars for the light work, and these are doing the work well. I sold the Consolidated Gas Company of New York 8 cars, and it has many other cars that perform all of its hauling from its gas stove depot. All the Company's light delivery work is done with a light car, costing about $1,600 or $1,700, complete, ready to operate, with everything there is to it, and a man to go with it to show you how to operate it. Right in Indianapolis is a car built by the Waverly Company. It is even a lighter car than we make, and consequently can go more miles, but whether it is constructed for lasting I am not able to say. I am not familiar with it. I never look much into my competitor's stuff, for I am too busy looking at my own. It think it might do very good work. If you wish to see a car that has been running in your city for 8 years, look at these of the Adams Express. They have been running 8 years, and are just as good to-day as they were in 1905.

Mr. Maxon—Will Mr. Smith tell us what would an electric truck, carrying an average load of 1,000 lbs., and running 1,000 miles a month with current at 2 cents per K.W., cost per month.

Mr. Smith—I will not give our estimates in answer to this. When selling a truck I give my own opinion, but I am appearing by the courtesy of this Association and I am going to give the highest cost. Quoting the Massachusetts Institute of Technology, the investment is figured at $2,200 on a 1,000 lb. car. That is too high. Interest is figured at 10 per cent., and cost of current is put at $160 per year. That should be the cost for perhaps two years, so you can take $80 therefrom. The garage or stable charge is figured at $200 a year; very high. The driver is valued at $710; you know whether that is high or not, gentlemen. The other figures are as high as they could possibly be figured. It is that 1,000 car is used 285 days in the year; but I do not think any company can show 1 gas car out of 1,000 in use that has run 285 days. That comes to $2,152 a year, employing the figures submitted.

Mr. Maxon—What is the mileage?

Mr. Smith—10,000 miles for the year. I wish you gentlemen would write to the Massachusetts Institute for any information that you want. Send for its "Bulletin No. 1," issued last March, and you will get the highest cost and the actual figures.

The President—Has anyone else anything to say on the matter of trucks. If not, the thanks of the Association are given to Mr. Dolley for his timely and valuable paper.

The Secretary here made one or two announcements, and the members adjourned to the lecture room, and there listened to the following, by Mr. H. N. Tolles, of Chicago, who spoke on

THE FUNDAMENTALS OF EFFICIENCY IN BUSINESS.

Mr President, I wish, in the first place, to say I consider it a high honor to have the privilege of addressing this convention. I am one who believes, as I have no doubt you believe, that success in life comes from following fundamental laws and principles. You men, successful men, are here to-day because you have, consciously or unconsciously, harmonized with natural law in the business world. While I am to speak to you this morning, please do not charge me with believing that I have said the last word when I am through, because in an hour's talk it is pretty hard to cover the "Fundamentals" in business efficiency. We realize we are living in a strenuous age. You men have seen, in your own line of business, things develop so fast, that the one who says things cannot be done is easily interrupted by some oneelse having done them. Of all the laws that operate in the business world I believe the greatest is that of confidence. Every word that you speak, and every act you perform, with every thought you think, either adds or subtracts confidence from the people with whom you come in contact. The most humble employee in your plant to-day, who, on going home to sit in the little home circle at the dinner table, with only the family friends says a disparaging word about that business, or about that management, or about his or her fellow employees, or about the buying public, or about the service the institution renders, I maintain that such person cannot go back on the job and do as good a day's work as if he (or she) hadn't said it. We coax our thoughts and influence our feelings, and the latter are well shown in our conduct; but our conduct influences men in business. Any patron of your service will not believe very much more in the service rendered than he believes in the person who renders it. That is bringing it pretty close. The man you try to influence in business will never believe any more in your business than he believed in you at first. And that leads me to this statement: You are not going to believe any more about the things that I saw and the slides that I throw on the screen than you first believed in Tolles. So I most earnestly court your confidence to begin with, and, recognizing that there are men in this audience who have had much more experience than I have, and that many, in fact all, of you, can tell me things I don't know; but I believe if we could here organize all the ideas enumerated in the heads of just you men, getting them here on paper and organize, crystallize and turn that knowledge over to another fellow, it would be worth $100 (or $1,000 possibly) more than that to every other man present. Therefore, we must profit by the experience of others, and the more we organize and systematize this experience the more successful we will become.

Now, to test the confidence you have in me, I will put each of you to an individual, personal test, where you can express yourself. Suppose I told you something, that, in the light of your own experience, you could not believe was true, but you believed it because Tolles said so. Let us see the hands upriased to that. No wonder you didn't come up front when I called you. I have something in my pocket I have never seen, that you have never seen and that no one here has ever seen. Do you believe that? Let's see the hands. Mr. Olds, do all the gas men come from Missouri? Well, gentlemen, I I will take something out of my pocket that I have never seen, something that you have never seen and something that no one else has ever seen, and show it to you. How many believe that? Just a few, have faith. Then I am going to take out of my pocket that which will disappear and which I will never see again; neither will you see it again, nor will anyone ever see it again. Let's see how many are ready for that? I hold in my hand, gentlemen, something I have never seen you have never seen and no one else has ever seen. I will show it you—the kernel of an almond that sees the light of day for the first time, nobody has ever seen that before. I have handled and shown to you something you have never seen before and no one has ever seen. Now it disappears (ea ing almond), and neither I nor you will ever see it again; and no one will ever see it again (Applause and Laughter). This is a picture (thrown on screen) of Luther Burbank, whom I had the pleasure and honor of interviewing in California last winter. Mr. Burbank has developed and founded wonderful things, as we all know. As the wizard of plant life, he has grown the thornless cactus. the pitless plum, the fadeless flower; he has made noted the white blackberry. He told me he had taken the old, pungent odor from the calla lily and had driven into it the scent of the rose. A few days ago I met a man who worked for him for two years. This man told me that Burbank had made over the old potato vine, until he had developed one that grows potatoes under the ground and fruit on top of the ground. He made the old pear trees get busy and produce two crops of pears in one year. My proposition is this: If Mr. Burbank can do these things with inanimate plant life, it is about time you and I should recognize we can make two thoughts grow where one grew before, make two sales grow where one sale was before, make that stenographer turn out two letters where she turned out one before. I had the honor of my name appearing on a programme with "Harry" Emerson. Mr. Emerson said that efficiency roots itself in the individual, and when you teach the development of the individual, you say the last word in regard to the efficiency of any plant. This illustrates the idea that the only way two men can differ physically is in the degree of development of their physical parts, and the only way two men can differ mentally is in the degree of development of their mental parts. The picture brings out the thought that we measure men not necessarily by the amount of money they make, but of course naturally the greater the vigor of the man, mentally and not physically, the more money he is able to produce. Too many people, too many employees are chasing the dollar, who are measuring life only by the amount of money they can get out of it. Money is not all. I once was in the employ of John Wanamaker, of Philadelphia. When I came before him for

my first interview, after a very pleasant introduction, he asked me to be seated and startled me with this question: "Mr. Tolles, what is your ideal in life?" I hesitated. I knew that Mr. Wanamaker had the largest Sunday School in the world and that he was a great church man, but I did not expect he was going to put a Sunday School question to me the very first thing. As I hesitated he said, "You like a man with an ideal or purpose in life, and if in coming here I can help you carry out that ideal, I want you to come; but if your ideal is counter to that which can be worked out here, I do not want you at any price. It seems to me the starting point in efficiency is to hold the right ideal before a man; rules are only made (so we are told) to be broken. This fellow has neither chart nor compass; he has not oars. He is simply taking things the way he finds them. Employees find it is so easy to turn that little, old canoe down stream instead of going up stream. In a picture I recently imported from England is shown a multitude of men whose wishbones are where their backbones should be. Wishing for success, they have not the backbone to stand up and demand the success they desire. Every institution can be represented by three circles. The outer we call business building; one represents the making of permanent patrons, and the other the holding of profitable patrons. Definite business building is the power to make permanent and profitable patrons. This morning you discussed the use of the auto-truck. A man selling a motor truck might say, if he thought you only had use for one truck, "I will sell this man one machine and that will do him the rest of his life." But permanency does not necessarily rest with your purchasing that machine, because hundreds of other concerns will look to see how much benefit you get out of such machine. Where it is impossible to make a repitition of a sale in a business, we can make that customer the first link in the endless chain to bring us many more sales. I will not stop on the question of profitableness. The second circle represents salesmanship. What is it? The power to persuade people to think the way you want. Take two men going down the street one of whom prefers one side of it to the other side. The better salesman (the better persuader), will win. All through life this question of salesmanship enters. The lawyer, the preacher, the doctor, the stenographes, are all salesmen; and I maintain that even matrimony is a sales' proposition. I had some experience in that, for it took me 10 years to land my "prospect;" but had I known as much about salesmanship then as I do now I could have landed that prospect in half the time. The body of your institution is business ability and its life is salesmanship; but the heart that pumps this life blood is service. In my belief the greatest business discovery in recent years was that the science of business was the science of service; service is cause and pay is effect. You say your institution is a great one because you have a great franchise; others say there institutions are great because they have many customers; others again say it depends upon having modern equipment. But I maintain the power to build up business after obtaining it rests with the individual who will develop service. Tennyson gave us the most definite road to power, self-knowledge, relf-reverence and self-control, which three of themselves will be of sufficient power to bring success. Whan a man knows himself he will know others, because we are all made of the same stuff. The chap who reverses himself will reverence the other fellow; the one who knows how to control himself will know how to control the other fellow. So self-knowledge, self-reverence and self-control, these three alone, lead to power. Suppose this represents a permaannt line, then let this represent a variable line or one which deviates, swinging back-and-forth; and let this represent the individual. In reality it would represent the institution, because success of the institution is nothing other than the success of the individuals who make up the institution. If every man in the latter is making good, your institution will make good, and if there is a single failnre along the line, just so much is subtracted from every other man in the institution. I do not believe man is independent, neither do I believe that any man is dependant; but I do believe that every man in business is inter-dependent, and when the labor organizations of this country learn this one principal along with the thought of service, we will see a great change in the industrial world of this country. I mantain that service is cause, and that pay is effect. Too many people say, "I am working 8 hours a day for $20 a week, and I am not going to do any more." There is where they make the great mistake. The definition of salesmanship is the power to persuade people to purchase at a profit that which is for sale. In Philadelpnia 2 or 3 years ago I had an insurance class. We took this definition and added a few more "p's." Salesmanship is the power to persuade plenty of people to purchase policies at a profit. This is a form of persuasion they used to have out west. Here is the salesman, there is the customer. Here is the selling talk, there are the selling points. Now, if our idea in business is to make permanent patrons, do you believe this customer will come back to do business with this fellow. I guess not. Let us take the simplest form. A baby sits on the floor with a stick of candy in his hand. You want to get that candy from him. How are you going to do it? There are two ways. One is to use force, the other and the proper way is to hold up an orange, shake a rattle or offer something else that the baby would rather have. He takes the new offering and drops the candy you pat yourself on the shoulder and think what a smart fellow you are; but did you ever stop to think—that boy has persuaded you at the same time. He would rather have that which you offered than the candy. And there is all that is in salesmanship. What you want the community to do is to drop the candy (their dollars) and take your service (the orange). That is all. The question is, "How are you going to do it?" One way is to ram it down their throats, but that is not the persuasive way, as you know. The better way is to hold it up so attractively that they will reach for it easily. A great deal is being said about this being the competitive age. I believe we are passing out of the competitive age and coming into the co-operative age. Suppose that baby had a razor in his hand. which you wanted to get away from him. How would you do it? You would not say, "You will cut yourself; look out; look out!" No, that would not be wise. You would say, "Come here, 'Charles,' quick, play marbles," and you would get him to drop the razor. Wanting a customer, are you going to knock the other fellow's proposition; and saying "No, no; don't use that." No you will hold to your own proposition, making it so attractive that he will see the advantages thereof. Here is a little story of two ladies who were riding on a street car in Chicago one day. One had married three times and was about to become married again. The other had not been married yet they had been chums all their lives. Jane said to Mary, "Mary, I cannot understand it. Here you have been married three times and are about to be married again. We went to the same school, are about the same age, wear about the same clothes and keep company with the same fellows, yet you have had at least 4 proposals, but nobody ever proposed to me. Isn't there some secret?" Mary said, "Certainly, Jane, don't you know you must have that come-hither in your eye?" It is the come-hither eye that does the business (Laughter). So it is the come-hither in the personality of the individual that counts. The sale is made in the mind, not in the pocketbook. It is the meeting of minds. Here is the salesman, there is the customer. If that salesman's mind is stronger than the customer's on his proposition, the customer will trot over to his way of thinking. There is another side to this. How many times have you sent men out, after getting them worked up into good selling talk on your proposition. Your man, going in, delivers his talk to a customer. The latter asks, "How much are you getting? I will give you so much if you will talk for me the way you are talking for this other man. So the salesman goes to buy what is sold and the customer becomes the salesman. They talk to me about the buyer. Why don't you emphasize the principle that the buyer is a salesman. He is selling the company's money just as the salesman is selling the commodity, and getting what he can for it. On this principle of service, the power to serve to the end of satisfaction—note the word "satisfaction"—and profit of both buyer and seller. It has to be a mutual transaction. No transaction is actual until it is mutual. The power to serve to the end of satisfaction and profit of buyer and seller is a matter of three things: First, know yourels; second, know your business; third, know your fellow man. Keep those three in mind as I talk to you. Let us speak for a little bit about knowing yourself. I suppose, going down the street and looking in a looking glass you say, "That is me; there I am;" but, really, do you know yourself? Do you realize that baby picture of yours does not represent a single atom in your present body, and yet you say that is your picture. A constant ego or quality within the individual remains constant, and his personality is dependent upon the development of that ego in himself. So, we can analyze a man into two parts, the physical and the mental. The latter we divide into three classes. Here is a dividing line. On this side we have unsuccessful qualities, or those that tear down; we call them negatives. On this side are the positive ones, those that develop and build up the physical man. We have health, the opposite is sickness. Some place between the zero point, over here on the physical, and the 100 per cent. perfect point, you are. I say some place between. If you were this way instead of being here you would be in your coffin, if you were at zero, and I never have seen an absolutely perfect specimen as far as health was concerned. I do not believe in the perfection of man, but I believe in his perfectability. So strength is positive, and it has as its negative weakness. Industry has as its negative laziness, and neatness has its repulsiveness. Those are the physical powers, and we vibrate someplace between the two extremes. Now we come to thinking qualities. Some people think. Some people think they think, and others just think that they think; and what do we think? The first thing is to observe. Every idea comes through the 5 physical senses. We hear, see, feel, smell of touch everything we learn. And, gentlemen, all that we are to-day is the total of all things we have heard. seen, smelled, tasted and touched up to the present time, plus the use that we have made of them. Wherefore, observation is a most important starting point. There are many ways of testing one's observation, but I must hurry. Next comes concentration (the second quality). The negative of diffusiveness. How in the man without the power of holding his own mind to a certain point, going to hold the mind of another fellow to it. The customer's mind is usually diffusive, and that salesman or business man who knows his art is going to use the power of concentration to bring that customer's mind back to the track. If he does this he has a better chance of doing business. Then come reason and judgment. Do you realize there are 5 kinds of judgments, any man may pass on any proposition, but there is only one correct judgment on any one proposition. Provided it is to the advantage of your customer to purchase that which you offer, if he does not buy he has passed one of the four. There is only one correct. If a man is qualified to detect which one of these 4 judgments that fellow has passed, and can cause him to change his mind, he can handle it much better than if he shot out all four judgments. How many unsound, prejudiced, extreme judgments are passed every day. I note that in a Washington despatch 331 lives were lost on a railroad because somebody forgot to send a message to hold the train, to repair the track, or other thing. On account of this those lives were hurled into eternity. Do you realize, gentlemen, that millions of dollars are being lost in the gas business in this country just from that little negative thing, "I forgot." Think it over and notice this: Every mistake any employee of yours ever made, or any mistake you have ever made, is directly traceable to one of these negatives. How many of

them can be traced to, "I forgot?" And here comes imagination. To this you must have to appeal. If I sell you this chair and pack it and send it to your home for your use, I must picture to you the advantages of that chair. If I haven't a clear image in my own mind as to the possibilities of its use, I cannot picture them to you. The gas range you want that customer to buy; it is in your showroom, and what you must do is to get the customer to imagine that gas range in her home all set up, and to have it in use as though it were hers. The only way you can do that is by appealing to the image, putting the imagination in her mind. Lots of people spend all their effort in convincing people in business on the thinking side, but there is another power, and that is the feeling side. I can prove to you that 2 and 2 are four by the thinking force, but I cannot prove to you that my dear mother, my boy or my wife is lovely. The only way I can convey that impression of love that that dear old mother has for me is the fact that you have somebody who loves you. If my mother is conscious and is living at this moment, that mother is asking this question. It is going right through her mind all the time: "Where is Harry?" and "Is Harry making good to day?" Further the greatest thrill that comes into her life is the thrill of the knowledge that her "Harry" did something worth while. Faith is an importent feeling, even though it has its opposite of doubt, but courage is a feeling that has its opposite in fear. Doubt and fear have killed more business success than all the armies have ever slaughtered men. We doubt ourselves, we doubt others. The salesman given a card and sent out says, when he gets it, "I don't like that writing; that dub won't buy it." Looks where she lives and says, "Nobody in that neighborhood is going to buy anything; but still I have to turn in a report." So he goes out, takes hold of the doorknob, and the door being opened, says, "Nothing doing here; nothing doing here; nothing doing here." It seems to vibrate all through the house. He salutes the lady, puts up the bigest bluff he can, and as he talks there is a little message going out from his mind "Nothing doing here," and her reply is, "Nothing doing." I tell you if we sit here, send a wireless message miles and have it recorded by a sensitive metallic substance, through simply causing the electrical waves to act, isn't it about time we made "talk waves" pass 10 feet, and record themselves in the minds of other people. If the salesman takes hold of the customer and says, "I have an idea I can sell you some goods," they are sold before he knows it. So feeling has a lot to do with it. Loyalty, of course, has a most important place in the success of business; of course its opposite is disloyalty. Loyalty is the first round of the ladder to success. If I have an employee who does just us well when my back is turned as he does when my face is to him I have got somebody I can bank on. These are those the business men are seeking to day, and the demand for that sort is active. Honor and honesty are other positives here. A Michigan man bought a horse from a trader, a particular friend of his. Discovering that the horse was blind, he took the animal back and he said: "Bill; that horse is blind. I don't want a blind horse." "Bill" asked, "Didn't you see that horse before you bought him?" The friend said "Yes." "Didn't you notice he was blind?" "Did you notice it, Bill?" Bill said, "Well, the fellow I bought him of didn't say anything about it, and I didn't suppose he wanted it mentioned." That principle is not entirely extinct in the gas business.

I have made the discovery, though, that the business world is moving to a higher plane of honor and honesty. We are coming to recognize that the man who tries to fool the other fellow is himself the bigger fool. I do not believe that honesty is the best policy in business; I believe it is the only policy. There are people who spend so much time thinking about their thoughts and feeling about their feelings that they haven't time to do anything else. I showed you the fellow with the wishbone back there. But these are only samples of some 60 brain areas that had been definitely located in the human mind. These mistakes are traceable in one individual to one particular quality; we will say, doubt. How are we going to displace doubt? By developing faith. We will displace forgetfulness by memory. We eliminate sickness by developing health. What happens to the negative? We do not know, any more than we know what happens to darkness when darkness disappears. The fellow that develops the positives of the physical powers is the one able to get into the game, and sit in it, healthy and normal to begin with. Then comes the thinking power; the development of the positives of the thinking powers gives us the man of ability. Men say if they had ability and endurance, such were enough, but without the development of the feeling powers men lack something. They lack reliability. We need men of action coming from the development of the willing powers I have enumerated here. You know there are so many people who spend too much time in getting ready. A man in a big fire insurance office in Chicago told me the other day that the greatest difficulty he had with his men, working on a commission basis, was to get them out in the morning. He said, "Some of the fellows hang around here until about 4 or 5 o'clock in the afternoon and have only one hour in which to get up enough steam to accomplish their work. This reminds me of two colored boys playing railroad in a junction town of Texas. One was a Union Pacific chap, the other represented the Santa Fe. The former was to go round the block, the Santa Fe boy was to go around it the other way. Union Pacific chap shot off in a hurry, and when about two-thirds of the way around he wondered where the other was. He kept going until he reached the starting point; and what do you suppose he saw there? The Santa Fe boy was playing mumblety-peg with the other negro lad. Union Pacific, who was pretty angry blusted out, "Ain't you playing railroad? What are you doing here." Union Pacific got the reply, "I was at Santa Fe; 4 hours late," Many business men playing Santa Fe are 4 hours late. They are getting ready to start something when it is too late. As to judgment (showing picture). Who of those two men is the larger? As a matter of fact, this one, from here-to-here, is the same height exactly as the other fellow is from there-to-there. You can measure them, yet this fellow looks smaller. Why? Simply because of the environment. We do not disassociate all these marks, figures, and things around here from these two people, and you would naturally think the one nearer front would be the larger. Here are two lines looking exactly straight and parallel; and they look very much otherwise. So many men of business have warped judgments, and the thing to do with the man who has passes a warped judgment on your business is to remove the shadow producers from off his eyes and show him. As to ability. Here is one long in ability, in reliability, in endurance and in action. Area supplies area. The mental area of any man is simply a question of how much heretofore has that man developed his faculties or qualities. One man develops one quality, another man develops another; but this fellow has everything that the other has. The difference is in degree of development of their mental qualities. Here comes along opportunity. That opportunity is not an opportunity for one fellow or the other. It is only an opportunity for the man who has the area larger than the opportunity. If you are in trouble and wish to find the pariy to blame go hunt a looking glass. Nine times out of 10 you will locate the trouble by looking in a mirror. Any old tinpan in which you can see your reflection will do. Take the man with a systematic mind; then take the one with a scattered mind. One fellow's desk is all littered and cluttered up, whereas the systematic minded one's desk shows a place for everything with everything in its place. Many years ago I was in Missouri and met a man who said, "I heard your lecture and I liked it all right; but I think I am all right." I said, "Is that so?" He replied, "Yes; I don't see any negative qualities about me." He owned a printing establishment. I said to him, "The principal trouble with you is that you are afflicted with 'scatteration.' Your mind is not systematic." He asked, "How do you know?" I said, "I'll bet if you had 5 jobs on hand and were doing the work alone, you would be working on all 5 jobs at the same time." He said, "How do you know? You have never been in my print shop." I said, "Look at your desk?" And this is a picture of what it resembled. A man's habits are revealed by the things around him—his clothes; and if you want a real, good test, just look into his upper bureau drawer. Say we have a man with lots of ability and long on reliability, on endurance and action. A chain is no stronger than its weakest link. I am going to ask you how many of you here feel that you are perfect? Where are those fellows voting with me a while ago. "Sam." Jones was delivering a revival sermon down South before a vast congregation, and he asked, "Is there a lady in this audience who has never sinned? If there is, please hold up your hand." There was no response. Then he said, "Is there a man in this audience who has never sinned," and 3 hands went up over that vast congregation. He asked them to please step forward. "I want to shake hands with you." Those fellows had the nerve to walk up in front and he shook hands with them. Then he said, "Just a word; please face the audience. Ladies and gentlemen, you are now looking into the eyes of 3 of the biggest liars in the United States. Please be seated." We must confess we do not consider ourselves perfect, hence we must be defective in one or more of those 60 qualities. This illustrates a man phenominally imperfect in ability, his observation, or judgment, or reason, or memory, or imagination. On the principle that a chain is no stronger than its weakest link, a man is no stronger than his weakest part. A certain amount of ability and endurance and action is now being used to the best advantage in that particular man. The one logical thing that any man may do, is to size himself up, finding out his weakness, then getting busy to develop that ability until he squares himself. Those principles are universal, and apply to any man, I care not how big, old, or important; and here is a good thing for some one to use who cares for it. The mind is always plastic and it is never plastered. The physical muscles may be developed even after a man is 60 or 80, and so also may the mental muscles be developed by proper thought exercise. If I want to develop any muscle I must exercise it and feed it on wholesome food. The most we can do is to have employees use their minds, to exercise them, and to feed them with wholesome food of a mental character. At the close of an address a couple of weeks ago a man said to me: "Mr. Tolles, I am through reading the stuff that I have been reading. I finished a blood and thunder story, just before coming to your lecture, and I tell you right now that another book on that style will not be read by me. I am going to select proper stuff for my mind diet." Men in your executive positions can do much towards directing the people in your employ to read good literature, and to keep them developing along pure and right mental lines. Much is being said about pure food laws, and there should be more said about pure mental food laws. On the question of the goods. Here is that gas range more or less plain to the naked eye, and here again it is under a magnifying glass. Closer analysis reveals other selling points when you put it under the magnifying glass. A Boston man in selling patent leathers used certain methods. He said to me, "Mr. Tolles, if you were selling these shoes, would you use all these points?" I said, "No; not any more than a doctor would use all his medicine for one patient, or one type of illness." What the business needs is points, not words. The days of the verbal cyclone, the American windmill and veritable talking machine are over. Points count now; and these should be analyzed or gotten at in such way that a man can drive his point home to the particular type of customer in an effective way. I believe in systematic selling talk. I believe any selling proposition is susceptible of treatment, and that every first-class institution should have its sales manager. They know the best things that can be said about

your service and your goods, and your men ought to be trained. As to the matter of answering objections. Suppose 5 men go out from your institution to meet a customer and listen to objections. How many answers will that person get? As many as there are salesmen. We talk about standardizing our machinery, and it is now about time we standardized the manner of talk that goes out to customers in the analysis of a proposition. The man may not use all his "talk," but the very fact that he knows carries conviction to the mind of the person whom he seeks to convince. The question of the customer is next. Originally I had no faith in character analysis. I did not believe one could tell by looking at a man, what his thoughts were, or make a good estimate of his mental faculties. The more I have studied this the better I am convinced that a man's interior is reflected by his exterior, and that the latter reveals the former. Going down a side street, seeing a butcher's sign, you know he sells meat and not silk. So I believe we can tell from a man's face much as to his character. Psychologists have located the intellectual side, the thinking qualities are concentrated here. Those feelings that we are talking about are located there, and the will power is here. Some people as a preliminary to thought scratch their heads back here, or down there; don't scratch here, gentlemen, but there. The man who is highly developed here, running to the "V"-shaped face, is of the intellectual type. The man who is round in face and body is of the vital type; he is the luxury lover. Then here is the chap who is square across the forehead; generally, he is emotive. I maintain if you were to put up a proposition to him it would be folly to use the same kind of a line of argument that you would use to either of the others. You have to appeal to his mind; logical, clear and quiet, he thinks analytically, therefore, you must arrange your speech accordingly. This man is of the vital type. You want to see him after dinner, and you will sell your goods. Here is the man looking for the profit, and you have to show him service and value in your goods. In addition, gentlemen, here is a further point. The former had only to do with the proportions of the man, of the face and body. Another is color. The extremely light in color we call electric; the extremely dark we call the magnetic. One may illustrate this by taking iron. When cold it is black; heat it and it becomes red, then white. What takes place? The hotter the iron gets the faster the molecules move. Beginning at the bottom of our color scale, we have the negro; going up, we come to the albino, the white, at the other extreme. Some place in that scale, from zero to 100 you and I figure, and all of our customers as well, so I maintain it is worth something to know whether the man is alert, quick, changeable, or whatever else. One mistake people make, and one that made trouble for me, is, we often judge a man by one characteristic. Some time ago a man said, "You see that fellow? He should be in the penitentiary. He is a rogue and scoundrel; he is dishonest." I asked, "How do you know?" His answer was, "Look at his ear; a man once fleeced me out of a lot of money who had an ear just like that fellow!" We cannot judge a man by one quality any more than we can tell all that on a printed page by seeing one word. The sharp featured fellow is what we call an acid; the other (the alkali) and is the round-featured chap. The man who wrote this text likened the acid to the lemon, the other to the banana. We all have handled the former, but we do not know so much about the latter type. The characteristic of the lemon first is penetration; being practical he is on the make. The other being milder, is inclined to be theoretical. In a bartering way, I said, "Doctor, I think we need another type, the citron, which I think could be called a disease the 'citronitis' (sit-around-itis), for instance. The man so afflicted suffers more than if attacked by appendicitis. It is harder to get him to go out than it is to get an ordinary surgeon to remove an appendix from the suffering one on such account. In Chicago I made an address just before election time on character analysis, in which I pointed out we had 3 presidential candidates this last fall who illustrated the three types. The mental type, Wilson; the vital in Taft, and the action-type in Roosevelt. I had a cartoon illustrating this clearly. I also said: If you desire a candidate who will figure things out, who is a student, who knows the history of nations, who will study things from the standpoint of cause and effect, then vote for Wilson. If you want a man who will sit, who is just a "sitter," then vote for Taft; and if you want one who will make things pop and sizzle, vote for Roosevelt. I believe you and others like you, have greater power over trade conditions in America than has Wall street. I believe that if every salesman and every person who comes in contact with trade would take an optimistic view and express it on every occasion, old Wall street would not have very much influence. This man (indicating President Wilson on picture) is one of the greatest men America ever produced. He has rendered the United States a greater service than we are willing to admit. He has been a wonderful man in many ways, and I believe we are to have one of the best administrations we ever had under him, although it breaks my father's heart to hear me say it. My paternal parent is an old, rock-bottom Presbyterian Republican from the very start. Nevertheless I am sure he will in time admit that Mr. Wilson will render this country the greatest possible service. "He profits most who serves most." Now, let us crystallize and I am through. I maintain there is as much science in business as there is in botany, in chemistry, in law or in music. There are 4 elements in every sale: The salesman, the customer, the thing to be sold, and the sale itself. Commencing first: It is a matter of development, and every man can be developed; now, the customer. We can learn much about him; and I maintain that the best judge of human nature, other things being equal, is the best business man. Therefore, this question of knowing the types, as indicated by faces, is very important. The thing to be sold; this is the study or knowledge of logic, with an ability to analyze and then construct. It is largely a matter of the study of psychology. My grip contains a number of a current magazine, and I was very much interested in an article therein on the subject of psychology in business. In its interesting things is the prediction that the business man of the future will be a student of psychology. In another column is told why men fail in business, and each failure was traceable to negative conditions. So, under psychology, we must study the approach to the will through our knowledge of physical qualities. Then taking the mental states, the mental law of mutual benefit. As every transaction must be mutual, the first thing is to get attention. You take the mind to interest, to desire and to possession, and never put anything in your life before you desire it, for you were never interested in a thing until your attention was caught by it. Here is a psychological truth; you never purchased anything the first time you attention was called to it. How many men here own flying machines or automobiles? When you purchased an automobile it was not the first one you had ever seen, and the first time that a woman sees a new appliance do not be discouraged if she does not buy it. Being something she had not seen or had knowledge of directly or indirectly, there is great virture in advertising. Keep before the attention of the people the new things coming up, keeping the possible purchaser interested, then, with additional selling points, you finally drive the customer to desire, and next you sell. Many sales fail because the salesman don't know how to get the mind up to the sale. There is great art in the ability to close, and more sales are lost from overtalking than undertalking. Mark Twain, going to hear a returned missionary preach one time, had something like $50 in his pocket. When the missionary had talked a little while Mark thought he would give him $10; then he talked him up to $15, and finally he thought $50 would be about right, and his pocketbook would be emptied. The missionary kept talking and Mark remarked mentally, "I guess maybe it would be a good thing for me to borrow another $50 and give him." It being a hot day, but the fellow kept talking on-and-on, wherefore Mark eventually reduced his contribution, $10 at a time, and when the basket was passed he put 10 cents in it. Many men say they are busy and have not time to develop themselves. You have all the time there is; no man has any more. The world is full of people who weaken their eyes, sitting watching the clock. How easy it is sometimes to turn that man's mind from a negative course to a positive one, so that he sees the means of utilizing his time, so that it is worth more. A very successful merchant was once asked how he gained his success, and I am permitted to quote you this: "I built my fortune on the dial of my watch. Seconds became pennies, minutes dimes, and hours dollars. I gave a money value to every tick and took advantage of everything that economized time. I never procrastinate. I never wait for people to get ahead of me. I look at a thing well, and, when my judgment approves, I go ahead. I do not know that there is any rule for success." The reason some people accomplish more is because they attempt more. Once in a while we find one who attempts too much, but the percentage of those is small. Burbank attempted great things in plant life, but confined his attempting to his own line of business. Edison has accomplished much in his own line. The Wright Brothers have accomplished much by attempting great things in their plane of work. If I have said anything to you gentlemen that is worth while, think it over. Practically I am a stranger to all here. I hope I have secured your confidence, and have developed something in your own minds that you will think over, so if, when back on the job to-morrow, you do better work or manage your business affairs more successfully, through this hour's talk, I will be very happy indeed that I made it. There are 4 types of men: The one who knows and knows that he knows; he is wise. Next, he who knows not and knows that he knows not. He is a child; teach him. Wisdom comes when we are willing and able to humble ourselves as little children, recognizing that we can learn from one another. The very fact that you are here at this convention shows that you realize you may learn from one another. Following is the one who knows it all, and knows that he knows it all, and next is the chap who knows it all, and does not know that he knows it all. Here is a little story (it is not an advertisement in any sense) a copy of which I think each of you should have. Editor of the "American Jeweler" had a boy in his employ who wanted to run the whole place, although he could not run himself, so the Editor went home, wrote this story and mailed it anonymously to the magazine. The boy read it and said to the Editor, "Do you know; this is one of the finest things that ever came to this paper. We ought to publish it." The Editor says, "Do you think so? If you want to publish it, go ahead." The Editor said afterward that the trifling story was the making of the future of that little fellow. Business man after business man had passed on it, one of whom said it beat any message to Garcia that ever was written. Read it, then write the names of the employees who you would have read it, but see to it that each one returns it to you. I will very gladly contribute it for the reason that I do like to know to whom I have talked. I like to make acquaintances and then to make that friendship closer, for our friends are our greatest assets in business. [Prolonged applause].

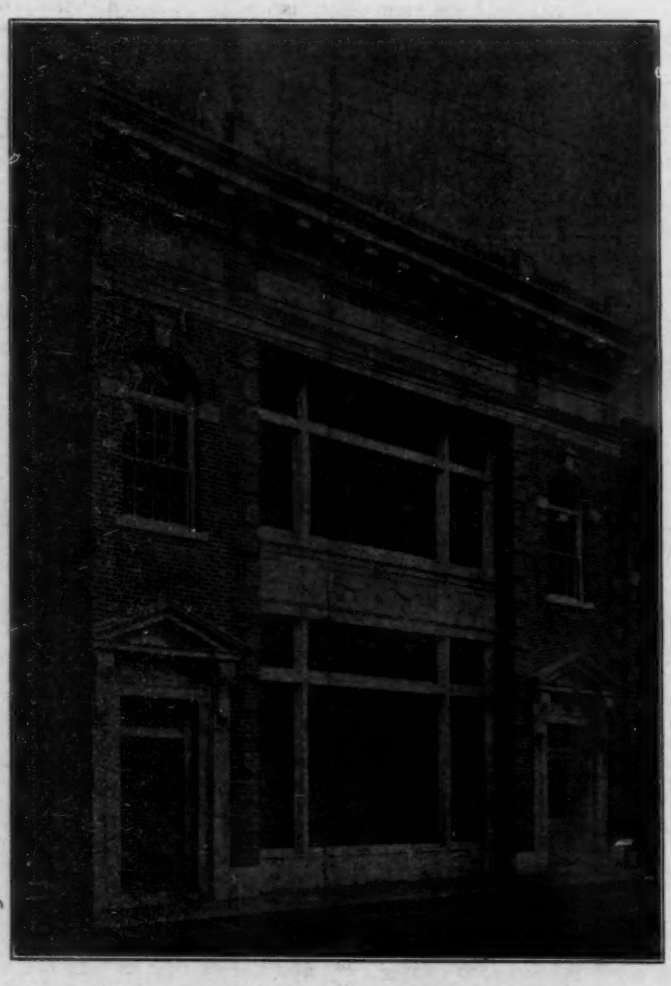
The President—I am shot full of holes, and wanting to know that all of you are in the same class, I feel you are all "shot full of holes." I think this is the most valuable address ever been given before the Indiana Gas Association. It is one we can all think about and get profit from. The Association owes a very great vote of thanks for having Mr. Tolles meet with us to-day, and I shall entertain a motion to such effect. On motion (seconded) a unanimous resolution of thanks (by standing vote) was given to Mr. Tolles. The latter, in responding thanked the members and assured them of his hearty appreciation of the vote. He really did not need the vote, for

he had the surest form of appreciation through noticing the attention that had been given his talk covering 1½ hours' time.

The Secretary announced that the members would now ascend to the roof, from which standing point they were to be photographed. A recess was ordered. (To be Continued.)

New Methods and Appliances.

NEW OFFICE BUILDING, SALEM (MASS.) GAS LIGHT COMPANY.—The illustration nicely reproduces the main features of the office building, recently completed and just occupied by the Salem Gas Light Company, as its headquarters and showroom, for active dealings with the public, and for the comfortable and convenient housing of its executive force. It is located in the business heart of beautiful Salem, and the Salemites are proud of the structure and prompt in their acknowledgment of the public spirit of the men who control the corporation.



The structure, as to exterior and interior, was on public view during the week ended the 15th ult., and the following Monday the Company took official possession of the handsome quarters.

The first floor is finished in rich mahogany, and is for the cashier and bookkeepers and information department, with private offices for Manager Tudbury and Treasurer Sluman. A flight of stairs leads from the public room on first floor to the display rooms in the basement, which comprise a general exhibition and demonstrating room, a model gas kitchen, and a room devoted to industrial appliances. The shops are in a separate building in the rear, which houses the distribution shop, the store rooms, the shipping department, the meter shop, etc., all having telephone and pneumatic tube connections with the main office.

The second floor of the main building is let for office purposes. Visiting gas men are invited to make an inspection of this very complete and modern structure.

COKE QUENCHING FOR CHAMBER OVENS.—In a recent issue of the *Journal für Gasbeleuchtung*, Herr N. Renbold, anent the matter named in the heading, notes that, up to the present, coke from coke ovens has been almost exclusively quenched by hose sprinkling, but the introduction of chamber ovens necessitates some better means of quenching, in handling the bulk discharges of hot coke. The best method so far found is that of immersion, an apparatus designed for that purpose being shown in Fig. 1. This machine was designed with

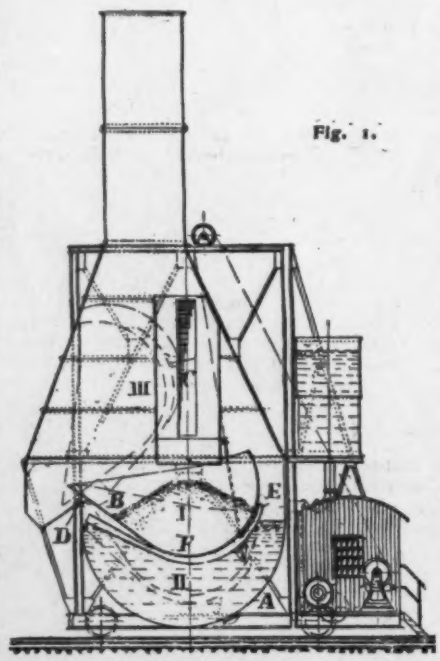


Fig. 1.

a view to economy in water, electricity and labor, and is giving satisfactory service at the coke ovens at the Neumühl coal mines. The water tank, *A*, is supported in the bottom of the frame work, and into it the coke holder, *B*, is lowered, after receiving the charge of coke from the oven, *C*. While the coke is being discharged from the oven, the holder, *B*, hung by a hinge at the point, *D*, is raised to the middle position, shown in full lines, and half immersed in the water. When it is full of coke, *B*, is lowered and as it sinks the water enters the jacket over the edge, *E*, and then through the perforations, shown at *F*, until it rises to the top of the coke. The holder is then raised to its third position and the coke is discharged, while the water runs back into the tank through the front end of the jacket. The only water lost is that evaporated by the quenching, and the stack shown in the cut is to carry off the steam generated.

The amount of water consumed is about 55 to 60 per cent. of the weight of the coke, and the quenched coke contains about 3 per cent. of water; as compared to quenched coke containing 4 to 5 per cent. and requiring nearly 100 per cent. of its weight for quenching. As the coke is lowered into the water the rising steam extinguishes any flames and starts the cooling, and the coke is not split into small pieces.

In some modifications of the apparatus it is combined with a travelling crane hauling the coke direct to the crushers or storage piles.

Items of Interest
FROM VARIOUS LOCALITIES.

"F. S. R.," writing from Geneva, N. Y., under date of the 27th inst., says: "Mr. G. G. Brown, formerly the popular New Business Manager, at Geneva, N. Y., recently resigned, to accept a similar position with the Ithaca (N. Y.) Gas Light Company. Before leaving for his new field, his former associates in the employ of the Empire Gas and Electric Company (Geneva), presented him with a handsome travelling bag. Although the presentation came as a great surprise to Mr. Brown, he nevertheless managed to express his appreciation of the gift and the spirit which prompted it in a few well spoken words. His old-time associates are predicting great success for Mr. Brown in his new field."

THE Rochester (N. Y.) Railway and Light Company is proposing to extend its service to the fast growing settlement of "Sea Breeze," in which place at least 200 separate owners have signified their eagerness for a gas service.

WITH much regret we chronicle the passing away, in Columbus, O., the afternoon of the 23d ult., of Mrs. Henry D. Turney, the estimable wife of Mr. H. D. Turney, President of the Columbus (O.) Gas and Fuel Company. Deceased was a daughter of the late Mr. John Bartlett, for many years President of the banking house of Bartlett & Brown. She is survived by her husband, and 3 daughters, Mrs. Sumner T. McKnight, of Minneapolis, and the Misses Evelyn and Ann Turney.

COL. PAUL DOTY, the clever controller of the fortunes of the St. Paul (Minn.) Gas Light Company, last month was one of the speakers on the occasion of the banquet of the American Association of Mechanical Engineers, during the recent meeting thereof, and a right good speech he made. Possibly the most telling point in his forceful address was the assertion that "The Councils of all the large cities should have in their membership a mechanical engineer so to be advised properly of the nature of the engineering problems that are extensively showing in connection with the most vital matters pertaining to the welfare of a community."

THERE will be no change for the coming fiscal year in the rates that may be charged for gas and electric currents by the Oakland (Cal.) Company.

"B. M.," writing from Springfield, Mass., under date of the 26th ult., says: "Last Wednesday was notable in the annals of Orange street, Westfield, particularly in the instance of those concerned in

celebrating the 92d recurrence of the birthday of Mr. George Slauter, who for 28 years had been connected with the old Westfield Gas Light Company; first as general all-round man, then as a meter taker, next as foreman, and finally as its Superintendent. In the latter position he served for 2 years, retiring from active business in 1892. I am glad to say that the old veteran enjoys good health, and is able to enjoy short trips in and out of town. He owes his connection with the gas business to that well-remembered, well-beloved member of the fraternity, ex-Mayor Dwight, of the Springfield Gas Light Company, to whose death, through an explosion in the purifying house of that Company (I think, in December, 1870), may be traced the formation of the New England Association of Gas Engineers."

AT the annual meeting of the Middletown (Conn.) Gas Light Company, the only change in the Directorate was the addition of Mr. Edward M. Bradley thereto. The Directors subsequently named these executive officers: President, W. H. Burrows; Treas.-Secy., Henry L. Mansfield.

LAST month the Chemistry Class of Fitchburg (Mass.) High School, under the guidance of Prof. James A. Chalmers, teacher of the Class, visited and thoroughly inspected the model plant of the Fitchburg Gas and Electric Light Company. In their journeying through it the various stages of manufacture were thoroughly explained to the Class, by the Superintendent, and the Class, by and through a vote of thanks, acknowledged the interest with which they had observed the phases of an operation respecting which their former ideas of its complexity were very slight.

THE Massachusetts State Senate has rejected the bill under which it was proposed to direct the Natick Gas Company to reduce its selling rate to $1.50 from $1.60 per 1,000 cubic feet.

"L. L. M.," writing from Cincinnati, O., under date of the 28th ult., says: "I presume you have heard of the change in ownership of the Paulding (O.) Gas Light and Fuel Company, which corporation has been taken over by Mr. T. S. Atkinson and associates, of Van Wert. The works are to be completely reconstructed, and Mr. V. B. McConahy, of Greenville, O., has been appointed Superintendent."

MR. JOHN J. KIRKPATRICK, Superintendent of the Holyoke (Mass.) Water Works, has been appointed Manager of the Holyoke Municipal gas and electric lighting plants. This appointment at last means a successor to Mr. William H. Snow, who was virtually forced to resign the post last June by that immaculate reformer, Mayor White.

THE gas rate in Fort Wayne, Ind., will, on the 7th inst., be reduced to 85 cents per 1,000 cubic feet—a concession of 5 cents per 1,000—as per the tenets of the agreement under which the Indiana Lighting Company operates.

"LAST month the Freeport (Ills.) Gas Company further popularized itself by 'loaning' to the Ladies' Aid Society of the Christian Church the showrooms in its Stephenson street offices during the evening of one day and all of the day following. The Society in the lines noted held a cake and rummage sale, and the youngster in this place who did not have all the Easter colored eggs, home made candy, and the like, must indeed have been terribly orphaned. The women folks busied themselves with the Company's demonstration apparatuses, and a generally good time was had. The bakery sale the afternoon of the last day was a great money getter. I presume it is unnecessary to add that the Company supplied the quantity of gas used without charging therefor.—L."

THE auxiliary coal gas plant that will be constructed by the Austin (Tex.) Gas Light Company, at Third and San Marcos streets, will be up to an output of 120,000 cubic feet per diem.

MR. E. E. COLLINS and associates have been granted a franchise under which they will construct and operate a gas works in Little Falls, Minn. It is stipulated that: The gross rate may not exceed $1.50 per 1,000, with 15 cents off for prompt payment; that the heating value of the gas shall be not less than 600 heat units; that the lighting value shall be at least 18 candles; that the owners shall pay into the city treasury a tax of 2 per cent. per annum on the gross earnings; and that the rates are subject to revision every 5 year period.

MR. W. J. MASSEE, President of the Georgia Public Service Corporation (who did manage to secure a right to participate in the electric lighting supply of Macon, Ga., but who did not secure control of the Macon Gas Company) has applied to the Macon City Council for an opposition gas franchise. Whether or not the authorities will be bamboozled (or otherwise) into granting him such a franchise, remains to be seen. Meanwhile it is a certainty that neither he nor his associates can continue supplying electric currents to the people of Macon, for a further period of 12 months, at the prices now being charged therefor, and pay for the manufacture and distribution of said currents without either going down deep into their pockets or through failure to pay for labor and going supplies.

THE Bartlett Hayward Company, of Baltimore, Md., has been authorized to construct a storage holder for the Western United Gas and Electric Company on the Bosworth property owned by it, just south of Elgin, Ills. It is to have a diameter of 156 feet, and will carry 4 lifts, each 35 feet in height. It is to rest in a concrete tank, and is to be completed by November 1st.

MR. JAMES NESBIT HAZELHURST, of Atlanta, Ga., has been commissioned by the authorities of La Grange, Ga., to draw the plans and specifications for a gas plant, to be constructed and operated on municipal account, the tentative cost of which is to be a figure somewhere between the sums of $50,000 to $150,000. The plans and specications on this account are to be ready by June 1st. Mr. Hazelhurst will also arrange for the construction of a water plant, and he is to have supervision of the erecting of both systems.

THE municipal gas plant at Rockwell, Ia., has been sold to a Mr. W. F. McClelland. It was of some greased air type, and he will change it over as soon as convenient to a type that possibly, had the authorities known anything whatever about the gas business, would have enabled them to "keep actively in business," a while longer.

THE Ohio State Public Service Commission has assented to the proposal that the Akron Gas Company may sell its properties to the East Ohio Gas Company.

PRESIDENT FELTON, of the Macon (Ga.) Railway and Light Company, also of the Macon Gas Company, declares that his corporations, instead of thinking of opposing it, are heartily in favor of the proposed ordinance directing that duplicate readings of gas and electric lighting meters be left with the respective consumers.

RECENT advices from Baltimore are to the effect that Victor G. Bloede and his heelers, have secured from the Consolidated Gas, Electric Light and Power Company, their "pound of flesh," in that the latter has agreed to pay a certain sum for the Bloede electric lighting stations, known as the Patapsco Electric and Manufacturing Companies, of Maryland and Delaware. The value of the "flesh," saying nothing of what dropsical conditions seem to exist therein, is said to have been assessed at a total of $125,000.

MANAGER CLAUSEN, of the Winona (Minn.) Gas Light and Coke Company, is possibly not as "bright" as are some of the local rulers of that city, the name of which carries one back to the days of the Ojibways and other tribes of Chippewayan tracing; but he can show them that the lighting man is worthy of his hire. In witness whereof he seems to have convinced the city fathers that, if they want their streets and public buildings properly illuminated, they will have to pay "the lighter" a living wage.

THE Directors of the Frederick (Md.) Gas and Electric Company, at a special meeting, held in Frederick late last month, reported that the shareholders had "almost unanimously" voted to ratify the proposed merger with the Frederick Railroad Company. Out of the 4,000 common and 4,000 preferred shares, the holder of 1 share of the former was the only dissentient.

THE Gas Machinery Company, of Cleveland, O., has been awarded a contract for a double-superheater, carbureted water gas apparatus, to be installed in the works of the Georgetown (D. C.) Gas Light Company. Superintendent Holden is reconstructing the plant with the determination of putting all the apparatus in the best possible condition of working efficiency.

WE understand that the capitalists behind the project to construct and operate a gas works in Port Arthur, Tex., mean to go on at once with construction work. The incorporators (Messrs. George M. Craig, G. H. Eubanks and J. S. Connelly) aver that they will expend $100,000 in connection with this enterprise.

"B. R. L.," writing from The Dalles, Ore., under date of the 28th ult., says that $100,000 will be spent by the Wenatchee Valley (Wash.) Gas and Electric Company this season in the construction of a gas plant. This franchise, which was granted some years ago, contains the provision that a bond (it has been filed) in $5,000 shall be executed to guarantee the city against damages resulting from the laying of street mains; also, it is specified that the selling rate shall not exceed $1.25 per 1,000 cubic feet.

"A. W. C.," writing from Amsterdam, N. Y., under date of the 1st inst., informs us that Mr. William H. Cooper, Superintendent of the Chuctanunda Gas Light Company, of that city, has resigned, and Mr. George D. Conlee, Superintendent of the Binghamton (N. Y.) Gas Works, has been appointed to succeed him as Superintendent of works and distribution. Mr. George W. West, who has been with the Company for the past 14 years, has been appointed Cashier, and will have full charge of the business office. Mr. Cooper has accepted the place of Vice-President of the Stephen Stanford & Sons, Inc., of Amsterdam, N. Y., which corporation is known the world over from its manufactures of carpet.

AT the annual meeting of the Belle Plaine (Ia.) Gas Company, the officers elected were: President, C. I. Tenney; Vice-President, John A. Meyers; Secy.-Treas., H. R. Mosnat. The Company will install a duplicate plant, which we believe will be of the Tenney type.

The Market for Gas Securities.

The market for local gas shares developed quite a bit of activity in the week, and the movement does not seem in the nature of a mere freak, for at time of writing (Friday noon) the earlier quotation betokened that prices would go higher before any recession was reported. The opening came in to-day at 135½ to 136, and several trades were registered before noon. Of course, there is plenty of cause why the advance should occur at this time; in fact the wonder is that it did not happen months ago. New York city gas bonds are in particularly good demand, at figures that are higher than those reported for some time back.

Brooklyn Union, too, shows quite some activity, the figures in it to-day being 131½ to 134. In other out-of town gas shares, Peoples, of Chicago, moved up sharply to 113 to 115, and the peacefulness of the gas situation there portends an early crossing of the 120 mark. Washington gas is 422½ to 425; Laclede common is dull, at 101 to 101½, and Massachusetts gas (both common and preferred) is again beyond the 90 mark.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

APRIL 7.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	Cap ital	Par.	Bid.	Asked
Consolidated Gas Co.	99,816,500	100	135½	136
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	5,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	7,500,000	100	72	177
Detroit City Gas Co.	6,580,000	—	—	80
Detroit Gas Co.,5's	881,000	1,000	75	80
" Prior Lien 5's	5,619,000	1,000	97	100½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	101	102½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	59	63
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	98	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	99½	101
Standard	5,000,000	100	60	70
Preferred	5,000,000	100	90	100
1st Mtg.5's,due 1930,M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	131½	134
1st Con.5's,due 1945,M.& N.	15,000,000	—	106¾	107
Yonkers	399,650	500	180	—
Out-of-Town Companies.				
Bay State	50,000,000	50	0.19	0.20
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	85
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	87	90
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,882,750	100	90¼	91
Preferred	3,026,500	100	75¼	80
Consumers, Toronto	2,000,000	50	300	304
Consolidated, Baltimore	13,460,084		118¾	119
Mortgages, 5's	3,400,000	—		—
General Mortgage 4½	10,661,000	—		—
Con. Gas Co., Baltimore City, 4½	2,751,000	—		—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	130	133
" Bonds, 5's	10,500,000	—	104	106
Indianapolis	2,000,000	—	38	45
" Bonds, 5's	2,650,000	—	104¼	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	91	
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	96
Bonds, 1st 5's	8,822,000	1,000	98½	99
Laclede Gas Co., St. Louis.	10,000,000	100	101	101½
Preferred	2,500,000	100	99	102
Bonds	10,000,000	1,000	102¾	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	120	120
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	
Massachusetts Gas Companies, of Boston	25,000,000	100	90	91¼
Preferred	25,000,000	100	92¼	93
Montreal L. H.& P., Canada	9,000,000	100	235½	236
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	25	188	190
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	113	115
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
Pacific Gas and Electric Co.	15,500,000	—	58½	60
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	94	96
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	112¾	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	422½	425
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	—	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, Richmond, Va., October 15-17, 1913. Officers: President, W. R. Addicks, New York City. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting Sept. 1913. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keilor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 8, 1913. Officers: President, C. G. M. Thomas, Long Island City, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Gas Meters.—Monthly Section Meetings; Grand Commissioner, I. W. Peffly, New York; Gen'l Sec'y, H. Thurston Owens, La Crosse, Wis.; New York Section, Chairman, Will W. Barnes; Secretary, John M. Brock, 204 Percy street, Flushing, N. Y. Philadelphia Section; Chairman, L. R. Dutton; Secretary, H. F. Patterson, Jr., 831 Chestnut street. Cleveland Section, Chairman, F. R. Hutchinson; Secretary, Wm. Holtz, East Ohio Gas Co. New England Section, Chairman, F. M. Roberts, Haverhill; Sec., F. K. Wells, 60 Broad street, Boston. Winona Section, Winona, Minn., W. F. Clausen, Chairman.

Guild of Gas Managers of New England.—Annual meeting, March, 1913. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March ————, 1914 Chicago. Ills. Officers: President, W. F. Barrett, Chicago, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting, ———— September, 1913. Meetings of Sections, monthly. Pres., Preston S. Millar; General Secretary, J. D. Israel, 29 W. 39th street, New York City. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J. R. Jackson, 28 North Market street. Pittsburgh, Secretary, J. C. Mundo, Oliver Building.

Indiana Gas Association.—Annual meeting, March 12 and 13, 1914. Terre Haute. Officers: President, A. S. Cooke, Terre Haute; Vice-President, A. C. Blinn, Evansville; Secretary-Treasurer, Phimer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, May 22, 23, 24, 1913; Burlington, Ia. Officers: President, C. W. Fair, Atlantic, Ia.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October —— 1913. ———— Officers: President, L. O. Ripley, Emporia, Kas.; Secretary and Treasurer, W. H. Fellows, Leavenworth, Kas.

Michigan Gas Association—Annual meeting, September, 17, 18, 19, 1913; ———— Officers: President, W. S. Blauvelt, Detroit, Mich; Secretary-Treasurer, Glenn B. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1913; Mexico, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting and gas show, Dec. 1-6, 1913. Philadelphia, Pa. Officers: President, C. W. Hare, Philadelphia Pa.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, Cleveland, O., May 20 22, 1913; Officers: President, M. B. Daly, Cleveland, O; Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 18th and 19th, 1914 Boston. Officers: President, T. H. Hintze, Providence, R. I.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Annual Meeting, April —, 1913, ———— N. J.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn Belmar, N. J.

Ohio Gas Association.—Annual meeting, February ————, 1913, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City May, ——1913. President, F. W. Caldwell, Shawnee, Okla.; Secretary, H. V. Bozell, Norman, Okla.

Pacific Coast Gas Association.—Annual meeting, San Jose, Cal., September 16, 17, 18, 1913. Officers: President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, Henry B stwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, York, Pa., April 9-11, 1913; Officers, President, H. H. Ganser, Norristown, Pa.; Secretary-Treasurer. W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 11, 1913: monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city

Southern Gas Association.—Annual meeting, Charlotte, N. C., April 18-20, 1913, Officers: President, C. E. White, Montgomery, Ala.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May 21. 22, 23 and 24, 1913, Galveston, Tex. Officers: President, F. M. Loge, Jr., Galveston, Tex.; Secretary H. S. Cooper, 405 Slaughter Bldg., Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 14 and 15, 1913, Milwaukee, Wis. Officers: President, I. F. Wortendyke, Janesville, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.